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Agriculture, Food & Natural Resources

Open Textbooks

Intro to Irrigation Water Management Principles

Intro to Irrigation Water Management Principles

- Explain how the systems approach can be used to manage water in irrigated systems.

- Identify the fluxes (flows) of water and energy in an irrigated soil-plant-atmosphere (SPA) system.
- Describe how the Irrigator's Equation can be used to quantify the four (4) major variables involved in managing irrigation systems.
- Use the principle of conservation of mass to determine the water budget (also called water balance) of a soil-plant-atmosphere (SPA) system.
- Use the principle of conservation of energy to determine the energy budget (also called energy balance) of a SPA system.

A Guide to the Principles of Animal Nutrition (Open Textbook)

AG 05: A Guide to the Principles of Animal Nutrition

- Introduce and discuss the basic concepts of nutrition and some basic nutritional terminology
- Introduce and discuss fundamental nutrients in animal diets
- Introduce the different organs of the gastrointestinal tract in omnivores and herbivores that are involved in digestion and absorption
- Present the chemical structure of different types of carbohydrates and their importance in animal nutrition
- Discuss the digestion and/or fermentation carbohydrates in food-producing animals
- Introduce the fate of absorbed glucose and volatile fatty acids
- Provide information on bioenergetics of glucose catabolism in the animal body
- Present the chemical structure of lipids and fatty acids of importance in animal nutrition
- Discuss the digestion of lipids in food food-producing animals
- Discuss the biohydrogenation and conjugated linoleic formation in ruminant animals
- Discuss the role of lipoproteins in fatty acid transport, storage and metabolism
- Introduce the transport of digested fatty acids in the body
- Introduce how digested and absorbed fatty acids are mobilized and can serve as energy sources during times of need
- Describe the chemical structure of proteins and amino acids
- discuss the different classification of protein and amino acids
- Discuss essential and nonessential amino acids
- introduce the site of protein digestion or degradation in monogastric and ruminant animals

- Introduce different types of protein-digesting enzymes, their sites of release, and their mode of action
- Discuss the similarities and differences between monogastric and ruminant animals in protein digestion
- Introduce the fate of absorbed proteins and synthesis of nonessential amino acids
- Discuss the process of detoxification of ammonia produced through nitrogen metabolism
- Introduce and discuss the factors affecting the protein quality of animal feeds
- introduce different methods for assessing protein digestibility
- Differentiate between fecal and ileal digestibility and its importance in ration formulation for monogastric animals
- Introduce and discuss different vitamins of importance in animal health, nutrition, and food quality
- Introduce and discuss different water-soluble vitamins of importance in animal growth, health, and nutrition
- Introduce and discuss different inorganic elements of importance in animal health, welfare, and nutrition
- introduce and discuss different microelements of importance in animal health and nutrition
- Introduce different energy terminology and discuss energy flow through an animal
- Discuss the measurement of energy retention and disorders related to energy metabolism in livestock
- introduce and discuss the physiological role, requirement, and quality of water for maintaining animal health and productivity
- Introduce different feed additives that are used in the diet of food-producing animals
- discuss the role of feed additives in increasing nutrient digestibility, gut health, animal productivity, and food product quality
- Introduce and discuss some of the common methods used to measure feed and nutrient utilization in food animals

Basic Kitchen and Food Service Management

01: Trade Math

- Demonstrate the use of the metric and imperial/U.S. measuring systems
- Convert and adjust measurements, recipes, and formulas

02: Inventory Control

- Describe basic inventory procedures
- Take a basic inventory
- Extend a basic inventory
- Apply ordering and purchasing procedures

03: Food Costing

- Describe food cost controls
- Perform yield and cost calculations
- Cost and price menu items
- Describe overall food costs
- Describe the principles of menu engineering

04: Labor Costing

- Describe labour cost controls
- Describe the principles of planning personnel requirements

05: Budget and Business Planning

- Describe the basic calculation of operating costs
- Describe budgets and profit/loss statements
- Interpret point-of-sale information

06: Appendix and Terminology

- Completion

Cheese Making Technology

AG 07: Cheese Making Technology Book: 01. Introduction to Cheese Making

- Calculate the optimal time between adding culture and adding rennet in cheese making to ensure proper fermentation and curd formation.
- Determine the total time between cutting and draining in the cheese making process to achieve desired curd consistency and texture.
- Evaluate the total time between draining and salting in cheese making, specifically for vat salted varieties, to ensure appropriate flavor development and salt absorption.
- Classify and differentiate various cheese families, including predominantly acid-coagulated cheese, rennet coagulated fresh cheese, heat-acid precipitated cheese, soft-ripened cheese, semi-hard washed cheese, mesophilic firm/hard cheese varieties, and high-temperature hard cheese.

- Analyze and apply various technical criteria in cheese making, including species selection, milk standardization, coagulation techniques, moisture control, type of pH control, extent of acid development, salting procedures, type and duration of ripening, type of rind formation, texture of rind, texture and body characteristics, and melting properties.

AG 07: Cheese Making Technology Book: 02. Process and Quality Control Procedures

- Develop proficiency in general analytical requirements for conducting chemical and microbial analyses, including analytical quality control, proper sampling techniques for chemical analysis, and appropriate sampling methods for microbial analysis.
- Gain competence in analyzing and measuring total solids content in dairy products, utilizing the Babcock method for determining milk fat content, understanding the role and impact of cheese salt in cheese making, and identifying inhibitory substances that may affect the quality and safety of dairy products.
- Acquire proficiency in performing culture activity tests to assess the fermentation activity and effectiveness of cultures used in cheese making, and conduct rennet activity tests to evaluate the coagulation properties and enzymatic activity of rennet in cheese production.
- Develop a thorough understanding of acidity and pH concepts in the context of cheese making, including buffer capacity and its role in maintaining pH stability, accurate pH measurement techniques, the relationship between titratable acidity and pH, and the concept of titratable acidity as a measure of acid content in cheese.

AG 07: Cheese Making Technology Book: 03. Milk

- Master the knowledge of the principal components of milk and their roles in cheese making, understand the various factors that can influence milk composition, comprehend the suitability of milk as a growth medium for microorganisms, identify different types of microorganisms and their activities in milk, recognize the implications of mastitis milk and the use of antibiotics, and become proficient in conducting raw milk quality tests to ensure safety and quality in cheese production.
- Demonstrate proficiency in selecting and implementing appropriate heat treatments, homogenization techniques, and additives to cheese milk, resulting in the production of high-quality cheese with clarified characteristics.
- Comprehend the important parameters of composition, identify and analyze the factors affecting standardization, recognize various sources of milk solids, apply different types

of standardization techniques, perform relevant calculations, and apply general guidelines for effective milk standardization.

AG 07: Cheese Making Technology Book: 04. Acidification and Coagulation

- Understand the general functions of cheese cultures.
- Differentiate between lactic acid cultures and secondary cultures
- Recognize the impact of bacteriophages (bacterial viruses) on cheese production and quality.

AG 07: Cheese Making Technology Book: 05. Manufacturing, Ripening, Process Control and Grading

- Execute the entire cheese production process, including ripening the milk, setting the vat, cutting the curd, cooking, draining, washing, curd handling, pressing, and salting, resulting in the production of high-quality cheeses with optimal flavor, texture, and consistency.
- Demonstrate comprehensive knowledge and skills in understanding and applying the biochemical and biophysical changes during ripening processes, utilizing principal ripening agents, determining optimal cheese composition for curing, controlling temperature and humidity of curing, implementing various ripening treatments, and employing appropriate packaging techniques to ensure the production of high-quality cheeses with desirable flavor, texture, and aroma profiles.
- achieve the objectives of cheese production by demonstrating proficiency in controlling and manipulating moisture levels, pH balance, mineral content, and flavor profiles. This will enable them to produce high-quality cheeses that meet industry standards and possess desired characteristics, including optimal moisture control, balanced pH levels, controlled mineral content, and well-developed flavors.
- Identify and classify defects in cheese production, as well as apply appropriate grading criteria to assess the quality and characteristics of different types of cheese.

AG 07: Cheese Making Technology Book: 06. Composition and Yield Control

- Identify and assess the cheese yield factors that can be controlled at the farm level, such as milk composition, animal management, and feed quality.
- Identify and implement strategies to control cheese yield factors during processing, including milk handling, curd cutting, cooking, and whey drainage.
- Proficiently calculate the actual or absolute cheese yield (Y_a) by considering the components and their distribution during cheese making.

- Calculate predicted cheese yields using the Can Slyke and Price formula, enabling them to optimize cheese production and make informed decisions in the industry.
- Utilize the formula to estimate cheese yield based on key parameters such as milk composition, fat-to-protein ratio, and moisture content.
- Understand and analyze the distribution of components during cheese making, including the various factors that contribute to cheese yield.

AG 07: Cheese Making Technology Book: 07. Cheese Safety

- Manage risks in cheese production, ensuring safety, quality, and regulatory compliance.
- Develop and implement risk management strategies to mitigate and control identified risks, ensuring the production of safe and high-quality cheeses.

AG 07: Cheese Making Technology Book: 08. Some Alternate Technologies

- Produce high-quality low-fat cheeses by understanding the importance of fat, analyzing the current status, evaluating effects on composition, addressing defects, and developing effective make schedules.
- Utilize ultrafiltration in the cheese industry by understanding its principles, analyzing milk retentate properties, and exploring its applications for improved production.
- Evaluate the varieties of cheese substitutes available in the US, understand the types of substituents used, and assess the feasibility of developing a cheddar cheese substitute.

AG 07: Cheese Making Technology Book: 09. Ways to Use Whey

- Evaluate the composition, properties, and general processing options of whey to maximize its utilization.
- Identify and apply various uses of whey in different industries and applications based on its unique properties and nutritional components.

AG 07: Cheese Making Technology Book: 10. Selected Recipes

- Understand the production methods, characteristics, and flavor profiles of Feta, Camembert, and Blue cheeses.
- Analyze the production methods, characteristics, and flavor profiles of Romano and Swiss type cheeses.
- Examine the production methods, characteristics, and applications of cottage cheese (short set), quark, and cream cheese.
- Understand and apply the standards and regulations, ingredients, process systems, microbiology, calculations, and procedures involved in producing high-quality cheese

- Describe the characteristics, production methods, and unique qualities of Brine Brick, Colby, Gouda, and Montasio (Friulano) cheeses.
- Identify and compare the characteristics, production methods, and flavor profiles of Provolone and Cheddar cheeses.

Chemistry of Food and Cooking 1

Chapter 01: Essential Ideas

- Understand basic chemistry
- Understand the Scientific Method
- Understand matter and its phases
- Understand atoms and molecules

Chapter 02: Atoms

- Understand Atomic Number, Mass Number, and Isotopes.
- Understand physical vs. chemical properties and changes.
- Understand crystallization.
- Understand classification of matter.
- Understand element names and symbols.
- Understand the Periodic Table.
- Understand the anatomy of an atom.

Chapter 03: Measurements

- Understand Measurements and Units.
- Understand SI Unit (Metric) Prefixes.
- Understand the International System of Units (SI Units).
- Understand the U.S. System of Measurements.
- Understand density.
- Understand unit conversions.

Chapter 04: Energy Processes

- Understand energy.
- Understand calories: Energy Units
- Understand Thermal Energy, Temperature and Heat.
- Understand exothermic and Endothermic energy.
- Understand Phase Changes

Chapter 05: Compounds

- Understand compounds.
- Understand ions.
- Understand ionic compounds.
- Understand salt: A Common Ionic Compound.
- Understand covalent compounds.
- Understand the difference between ionic and covalent.

Chapter 06: Molecules

- Understand Shapes of Molecules
- Understand Electronegativity and Bond Polarity
- Understand Polarity of Molecules
- Understand Properties of Covalent Compounds

Chapter 07: Chemical Reactions

- Understand yeast.
- Understand chemical Reaction Equations.
- Understand Chemical Reactions.

Chapter 08: Carbohydrates

- Understand polysaccharides.
- Understand diabetes.
- Understand structures of Monosaccharides.
- Understand common Monosaccharides.
- Understand artificial Sweeteners.
- Understand disaccharides.
- Understand carbohydrates.

Chapter 09: Fats and Oils

- Understand Fats and Oils.
- Understand saturated and Unsaturated Fatty Acids.
- Understand trans Fats.
- Understand fats and oils.
- Understand soap.
- Understand hydrogenation and Oxidation
- Understand cholesterol.

Chapter 10: Proteins

- Understand proteins.
- Understand insulin.
- Understand trans fats.
- Understand amino acids.
- Understand peptides.
- Understand proteins and their structure.
- Understand denaturation.

Clinical Medicine 1: Small Animal Clinical Skills Textbook

AG 06: Clinical Medicine 1 Small Animal Clinical Skills: Unit 1

- Locate and gently occlude the following veins on a dog
- locate an appropriate site for intramuscular injection
- locate an appropriate site for subcutaneous injections
- ***
- Practice safe ways to approach a dog
- Practice performing restraint of a standing dog
- Practice performing restraint of a sitting dog
- Practice transitioning a standing dog into lateral recumbency, and performing restraint of a dog in lateral recumbency
- Practice applying muzzle to a dog
- Practice performing a ring hold on a stuffed cat
- Practice performing a three-finger hold on a stuffed cat
- Practice performing at least one towel wrap on a stuffed cat
- Understand how to place a muzzle on a cat

AG 06: Clinical Medicine 1 Small Animal Clinical Skills: Unit 2

- Identify a "problem list" for the medical record, based on information generated from the client interview
- Assess the circle of nutrition, through identification of animal-specific, diet-specific and feeding and environmental factors
- Identify nutritional risk factors using the WSAVA risk factor list. If you need a reminder of the nutritional risk factor list: WSAVA Diet History Form and Nutritional Risk Factors
- Identify human-related factors, client expectations and concerns that will need to be accounted for when developing a diet plan

AG 06: Clinical Medicine 1 Small Animal Clinical Skills: Unit 3

- Examine the tail
- Identify the organs' location and description
- Examine skin and haircoat
- Examine mammary glands
- Understand gait, stance and limb evaluation
- conduct a rectal exam
- Conduct an observational examination
- Manage tips on hydration assessment
- Understand body condition scoring on cats
- Understand body condition scoring on dogs
- Understand muscle condition scoring
- understand the animals' skull, eyes, ears, nose, mouth, salivary glands and neck
- Understand the animals' mandibular lymph nodes, superficial cervical ("prescapular") lymph nodes and the popliteal lymph nodes
- Understand the cardiovascular system
- understand the respiratory system

AG 06: Clinical Medicine 1 Small Animal Clinical Skills: Unit 4

- Practice proper stethoscope use
- understand the normal heart rate and respiratory rate ranges for dogs and cats
- Examine mucous membranes and recognize normal appearance
- Examine jugular vein and recognize normal appearance
- Identify and palpate the precordial region
- Identify and palpate the femoral arterial pulse
- Describe what S1 and S2 are in relation to heart sounds
- Use proper stethoscope positioning and relevant anatomy to detect normal heart sounds
- Begin to develop familiarity with normal and abnormal heart and lung sounds
- Understand basic physiology of abnormal heart and lung sounds
- Practice auscultating the cadence of the normal heart rhythm
- palpate precordium and arterial pulse simultaneously to detect any pulse deficits
- auscult the heart and palpate arterial pulse simultaneously to detect any pulse deficits
- Detect a sinus arrhythmia, if present in your group's dog
- Observe respiratory rate and rhythm prior to auscultation

- Use proper stethoscope positioning and relevant anatomy to detect normal respiratory sounds

AG 06: Clinical Medicine 1 Small Animal Clinical Skills: Unit 5

- Identify/confirm presence of a neurological problem
- Localize the lesion with the nervous system
- assess severity/extension lesions, and provide a prognosis
- Identify different mental status' such as: alert, depressed, stuporous and comatose
- Understand gait and posture topics such as ataxia, paresis, lameness and general posture
- Manage the assessment of cranial nerves, including menace response, pupillary light reflexes (PLRs), physiological nystagmus-strabismus, palpebral reflex, nasal septum sensation, masticatory muscles, facial symmetry- ears, eyelids, nose, lips, laryngeal-pharyngeal function and tongue function
- Understand postural reactions, including proprioceptive positioning and hopping
- Understand the spinal reflexes, such as patellar reflexes, flexor reflexes, perineal reflex and cutaneous trunci reflex
- Understand palpation, including spinal palpation, palpation of the limbs and deep pain perception
- perform a complete neurological examination
- Understand physical and orthopedic examination to proceed it
- Localize the lesion before work up

Culinary Math

Culinary Math

- Read word problems for understanding, looking for clue words.
- Correctly solve word problems using the four basic processes.
- Read ratio and proportion word problems for understanding.
- Correctly set up and solve ratio and proportion word problems.
- Calculate the conversion factor to adjust a recipe yield.
- Use the conversion factor to adjust the ingredients in a recipe.
- Understand how a recipe ratio is set up.
- Determine the correct amounts of each ingredient in a recipe given as a ratio between its parts.
- Read and understand real-world percent problems related to culinary math.

- Correctly set up the problems as proportions and solve for the missing value.
- Understand different types of business costs.
- Do some math related to basic budgeting of business costs.
- Understand different types of benefits and how they affect a budget.
- Know the relationships between weight and volume measurements in the common system.
- Use factor labeling to make conversions between common measurements.
- Understand the most likely measurement of volumes and weights in the metric system.
- Make conversions for measurements in the metric system using factor labeling.
- Use a bread recipe to calculate bakery percentages.
- Use bakery percentages to modify a bread recipe.
- Use bridges to convert between the common and the metric system.
- Make conversions with more than one step using factor labeling.
- Use a conversion chart to understand the relationships between volume and weight for different kinds of food.
- Use factor labeling to make conversions, including those that involve three or more steps.
- Find the usable portion of food using the yield percent chart.
- Determine the amount of food you need to buy using the yield percent chart.
- Use the formula given to make calculations.
- Calculate the edible portion cost when given the as-purchased cost.
- Find the cost per unit of a particular item by converting weights, volumes, and unit prices with factor labeling
- For conversions between volume and weight, you should use the conversion on the chart given in Chapter 12.
- Adjust cost for yield percentage.
- Find the total cost of a menu item, as well as the cost per serving.

CVM Large Animal Anatomy

AG 04: Cvm Large Animal Anatomy 01: Limbs

- Understand the anatomical structures and functions of the thoracic limb in bovine and equine species, including the bones, joints, muscles, and associated structures
- Analyze the anatomy of the distal limb in bovine and equine species, with a focus on the hoof, bones, tendons, ligaments, and vasculature, and their importance in locomotion and support.

- Evaluate the anatomical features and biomechanics of the pelvic limb in bovine and equine species, including the hip, stifle, hock, and foot structures, and their role in movement, weight-bearing, and stability.
- Examine clinical aspects related to the limbs in bovine and equine species, such as common injuries, lameness conditions, and diagnostic techniques used in veterinary practice to assess and treat limb disorders.

AG 04: Cvm Large Animal Anatomy 02: Neck and Thorax

- Identify and describe the anatomical structures of the neck and thorax in bovine and equine species, including the bones, muscles, nerves, blood vessels, and organs present in these regions.
- Explain the functional significance of the anatomical features of the neck and thorax in bovine and equine species, such as their role in supporting the head, facilitating movement and posture, and housing vital organs involved in respiration and circulation.
- Analyze the clinical implications related to the neck and thorax in bovine and equine species, including common diseases, injuries, and conditions that affect these regions, as well as diagnostic approaches and treatment options employed in veterinary practice.

AG 04: Cvm Large Animal Anatomy 03: Abdomen

- Identify and describe the anatomical structures of the abdomen in bovine, equine, porcine, and camelid species, including the organs, blood vessels, muscles, and other important structures found in this region.
- Explain the functions and physiological processes associated with the abdominal organs in bovine, equine, porcine, and camelid species, such as digestion, nutrient absorption, waste elimination, and reproductive processes.
- Analyze the clinical significance of abdominal anatomy in bovine, equine, porcine, and camelid species, including the recognition and understanding of common abdominal disorders, such as gastrointestinal diseases, hernias, and reproductive abnormalities, as well as the diagnostic and surgical interventions used in veterinary practice for treating these conditions.

AG 04: Cvm Large Animal Anatomy 04: Pelvis

- Identify and describe the anatomical structures of the pelvis, perineum, reproductive tracts, and genitalia in bovine and equine species, including the bones, muscles, ligaments, and organs involved in these regions.

- Explain the functions and physiological processes associated with the reproductive tracts and genitalia in bovine and equine species, including the processes of reproduction, pregnancy, parturition, and the unique anatomical adaptations that facilitate these processes.
- Analyze the clinical significance of pelvis, perineum, reproductive tracts, and genitalia in bovine and equine species, including the recognition and understanding of common reproductive disorders, such as dystocia, uterine infections, and reproductive tract abnormalities, as well as the diagnostic and therapeutic approaches used in veterinary practice for managing these conditions.

AG 04: Cvm Large Animal Anatomy 05: Head

- Identify and describe the anatomical structures of the head in bovine and equine species, including the bones, muscles, nerves, blood vessels, and sensory organs involved in this region.
- Explain the functions and physiological processes associated with the head in bovine and equine species, including mastication, sensory perception (vision, hearing, smell), respiration, and vocalization.
- Analyze the clinical significance of the head in bovine and equine species, including the recognition and understanding of common head-related conditions and disorders, such as dental issues, sinusitis, ophthalmic diseases, and neurological disorders, as well as the diagnostic and therapeutic approaches used in veterinary practice for managing these conditions.

Farming as We Know It: How Humans are Impacting Agriculture

Farming as We Know It: How Humans are Impacting Agriculture

- Urbanization
- Soil Conservation
- Shortage of Labor

Food Safety, Sanitation and Personal Hygiene (Open Textbook)

Food Safety, Sanitation, and Personal Hygiene

- Describe food safety regulations.
- Describe the causes and prevention of foodborne illnesses.
- Describe the principles of Hazard Analysis Critical Control Points (HACCP).
- Describe general food-handling and storage procedures.
- Describe the procedures for maintaining workplace sanitation and personal hygiene.

History and Science of Cultivated Plants (Open Textbook)

AG 03: History and Science of Cultivated Plants

- Understand the transition of human societies from foraging to farming and the role of cultivated plants in shaping civilizations.
- Comprehend the concepts of natural selection and domestication, and how they have influenced the evolution of crop plants.
- Explore the principles and techniques of experimental and methodical plant breeding, as well as the basics of plant biotechnology and genetically engineered crops.
- Analyze the societal impacts of genetically engineered crops and the ethical considerations surrounding their use.
- Evaluate the challenges and constraints faced by modern agriculture in feeding a growing global population, and recognize the need for sustainable agricultural practices in the face of climate change and socio-economic factors.

Meat Cutting and Process for Food Service

CH01: Meat Science and Nutrition

- Describe the chemical changes associated with slaughter
- Describe the aging, blooming, and tenderness factors of meat
- Describe diseases associated with meat
- Describe the nutritional value of meat
- Describe the handling and storage of meat and meat products
- Describe the composition and characteristics of meat

CH02: Inspection and Grading of Meats and Poultry

- Identify meat inspection levels and agencies.
- Define the meat inspection process.
- Describe grading regulations for meat.

CH03: Cutting and Processing Meats

- Describe the muscle and bone structure of meat.
- Identify suitable cuts of meat for various cooking methods.
- Identify primal cuts of beef, lamb, pork, and veal.
- Identify secondary cuts of beef, lamb, pork, and veal.
- Describe variety meats and offal.
- Describe cuts of game.

Modern Pastry and Plated Dessert Techniques

01: Scientific Principles and Techniques Used in Modern Pastry

- Describe the process of coagulation.
- Describe the process of gelatinization.
- Describe the process of crystallization.
- Describe the use of hydrocolloids.
- Describe the process of spherification.
- Describe molecular gastronomy techniques used in the pastry shop.
- Describe the use of low temperature and sous-vide cooking in the pastry shop.

02: Plated Desserts

- Describe how to design a plated dessert.
- Learn factors that will contribute to a successful plated dessert.
- Apply design principles.

03: Dessert Garnishes and Sauces

- Prepare garnishes from a variety of mediums.
- Describe the contributing roles of sauces in a plated dessert.
- Prepare dessert sauces.
- Describe the additional effects garnishes can have on a plated dessert.
- Describe the effect of garnishes on presentation.

04: Dessert Presentation

- Apply dessert presentation techniques.
- Describe the principles of plate presentation.
- Prepare and plan dessert menus.

CH05.01 Appendix: Standard recipes for dessert garnishes

- Completion

Rural Water Supply

Rural Water Supply: 01 Install Rural Water Supply Systems

- Describe pressure water supply systems
- Size private pressure systems and select a pump.
- Describe the installation of private water supply pressure systems.

- Describe the testing, commissioning and service of private water supply pressure systems.

Rural Water Supply: 02 Install Residential Water Treatment Systems

- Identify issues associated with surface and ground water sources
- Describe residential water treatment equipment
- Identify the components found in a residential water treatment system

Soils Laboratory Manual

Soils Laboratory Manual 01: Introduction and Review

- Orient students on all safety aspects of the Soils Teaching lab
- Review the course syllabus and the structure of the Soils Laboratory Manual
- Review basic chemistry and math skills that will be used throughout the semester

Soils Laboratory Manual 02: Soil Formation, Classification, and Mapping

- Recognize common rocks and minerals
- Relate common rocks and minerals compositions to (a) ease of weathering and (b) products of weathering
- Understand the general geology of Kansas
- Know the major types of soil parent materials
- Know the five factors of soil formation
- Recognize major soil differences as they are affected in soil formation
- Become familiar with the 12 soil orders
- Understand the structure of soil Taxonomy
- Become familiar with the contents of a county soil survey report
- Use a soil survey report for land use evaluation
- Explore soils in your local area
- Demonstrate proficiency in using the SoilWeb web application
- Become familiar with data available in the SSURGO database
- Describe a soil profile using a soil profile description sheet
- Delineate soil profile horizons
- Interpret a soil profile using the five soil forming factors
- Identify the impacts of management on soil properties

Soils Laboratory Manual 03: Soil Physics

- Differentiate the three soil separates (sand, silt, and clay) based on their particle size diameters
- Determine the percentage of sand, silt, and clay in selected soil samples using data collected from the hydrometer method of particle size analysis
- Estimate the textural class using the texture-by-feel method on selected soil samples
- Use a textural triangle to determine the textural class of a soil
- Understand the relationship between particle size and specific surface area
- Measure soil bulk density and calculate pore volume relationships
- Understand the effect of texture on pore size and water holding capacity
- Know relationships among moisture potential, movement, and availability
- Determine soil water content by weight and volume
- Measure saturated hydraulic conductivity and understand factors influencing rates of water movement
- Explain the operation of moisture monitoring devices
- Become familiar with the driving forces of soil water movement and how soil properties can affect soil water movement
- Review the key soil water contents and types of water held in soil at different tensions
- Examine some modern instruments used to measure soil water content and describe how they function
- Review common calculations for soil water measurements and movement

Soils Laboratory Manual 04: Soil Biology

- Discuss vermicomposting and review how worm farms are managed
- Visit the K-State composting operation at the Agronomy North Farm
- Learn about managing a thermophilic composting operation
- Discuss how organic waste from the KSU campus is turned into compost
- Conduct a test for compost maturity
- Define soil health
- Describe how soil health indicators are used to track changes in soil health over time
- Describe how soil health indicators are used to compare two different management practices
- Explain how soil organic matter influences aggregate stability
- Perform carbon cycle calculations for a Kansas farm

Soils Laboratory Manual 05: Soil Chemistry

- Measure the effects of different cations on colloidal properties
- Identify the soil components controlling ion exchange
- Determine the cation exchange capacity of selected soil horizons
- Understand the origin of soil acidity
- Measure soil pH with field and laboratory techniques
- Determine the role of aluminum in soil acidity
- State the relationship between cation exchange capacity buffering capacity, and potential acidity
- Write chemical reactions related to soil pH and liming
- Know the objectives of liming and the factors affecting lime requirement
- Measure limestone requirement
- Determine limestone quality

Soils Laboratory Manual 06: Soil Fertility and Management

- Utilize the RUSLE equation to estimate the erosion rates of a given hillslope
- Compare estimated erosion rates to "tolerable" rates of erosion, commonly known as T values
- Name and describe conservation practices that reduce water and wind erosion
- Become familiar with the federal, state, and local agencies associated with soil water conservation
- Learn to interpret information contained in a soil test report
- Make fertilizer recommendations based on soil test results
- Become familiar with K-State resources as well as publications available to farmers and gardeners
- Identify conditions under which soil is most susceptible to erosion by water

The Organ-ised Life of Animals

The Organ-ised Life of Animals: 01 Levels of Organisation, Homeostasis and Nomenclature

- Discuss structural organisation of the body
- Identify the different body systems
- Explain the process of homeostasis
- Describe the different body fluid compartments, and provide an estimate (%) of each of these compartments
- Explain how water balance is maintained in the body

- Define the terms osmosis and osmotic pressure and describe how they influence homeostasis
- Apply directional terms correctly
- Apply the terminology of anatomy, in order to understand the descriptions of body parts and their relative positions to one another
- Identify body planes and sections on models, charts or preserved specimens

The Organ-ised Life of Animals: 02 Tissues, Organs, Systems

- Describe the different types of cells in the body (nerve, muscle, epithelial and connective tissue)
- Describe the structure and function of the four main tissue types
- Discuss tissue injury
- Describe the process of tissue aging

The Organ-ised Life of Animals: 03 Skeletal System

- List the functions of the skeletal system
- List the structures of the skeletal system
- Identify the major divisions of the skeletal system and the major structures that forms these divisions
- List the main types of bones
- Describe the gross and microscopic structure of the long bone
- Describe the types of bone cells and tissues
- Describe the processes of bone growth: intramembranous and endochondral ossification
- Describe the process of bone growth in length and in width
- Explain the roles of various hormones in bone growth
- Explain the importance of nutrition on bone growth
- Explain the role of bones in calcium homeostasis, including detail of the antagonistic effects of parathyroid hormone (PTH) and calcitonin

The Organ-ised Life of Animals: 04 Joints and Movement

- Describe the structure and composition for different types of cartilage and joints
- List the different types of joint movement and describe the angular motion of joints
- Compare and contrast tendon and ligament structure and function
- Describe the stifle joint of a mammal

The Organ-ised Life of Animals: 05 Muscle System

- Identify the different types of muscle
- List the functions of muscle
- Describe the structure of skeletal muscle cells
- Describe how muscle fibres, connective tissue and nerves are arranged in muscle
- Describe smooth and cardiac muscle contraction
- Describe the difference between fast and slow twitch muscle fibres
- Compare the size distribution of different fibre types in two different muscles
- Explain the relationship between muscle fibre type and function
- List the factors that influence muscle growth or can cause muscle atrophy
- Explain how energy for use in muscle contraction is generated
- Describe coordinated muscle contraction
- Describe the process of muscle contraction from the brain to the sarcomere

The Organ-ised Life of Animals: 06 Nervous System

- Describe the major anatomical and functional subdivisions of the nervous system
- Describe the typical structure of a neuron
- Describe the role of each anatomical part of a neuron in normal neuronal function
- Describe the ways that neurons may be classified
- Explain the roles of the different types of glial cells
- Describe the conditions during resting membrane potential and the processes involved in an action potential
- Explain how action potentials are propagated between neurons
- List the major subdivisions and anatomical landmarks of the brain
- Identify the four main lobes of the cerebrum and their functions
- Identify the main brain regions involved in the control of movement, receiving information on somatic sensation and memory formation and storage and emotion
- Describe the role of the hypothalamus, thalamus and cerebellum
- List the meninges and the order in which they are found around the brain
- Identify the cerebral ventricles, surrounding fluid and difference between white and grey matter
- Describe the different cranial nerves and the structures they innervate
- Describe the gross and microscopic structure of the spinal cord

The Organ-ised Life of Animals: 07 Blood

- List the major functions of blood
- Explain the functions of the major components of blood (erythrocytes, leukocytes, platelets, plasma)
- Explain Packed Cell Volume (PCV) and how it varies
- Describe the main plasma proteins and their roles
- Describe how red blood cells are produced, including the roles of the liver, spleen and kidneys
- Describe the process of red blood cell turnover
- Explain the process of how blood clots (haemostasis)

The Organ-ised Life of Animals: 08 Cardiovascular System

- Describe the function of the cardiovascular system
- Describe the gross anatomy of the heart
- Describe the flow of blood through the heart
- Detail the process of electrical and mechanical events in a cardiac cycle
- Explain an ECG trace in relation to the cardiac cycle
- Explain the different heart sounds
- Explain cardiac output and factors that influence it
- Describe the autonomic nervous system influence on heart rate and stroke volume
- Explain the baroreceptor reflex
- List the types and function of blood vessels (arteries, veins and capillaries)
- Define blood pressure, diastolic pressure, systolic pressure, pulse pressure, and mean arterial pressure
- Explain the regulatory mechanisms for mean arterial pressure
- Describe autoregulation of blood flow

The Organ-ised Life of Animals: 09 Respiratory System

- Describe the functions of the respiratory tract
- Describe the gross anatomy of the respiratory system
- Outline the passage of air from the atmosphere to the alveoli
- Relate respiratory tract anatomy to function
- Explain the physiology of respiration including gas exchange, ventilation, O₂ and CO₂ transport in the blood
- Describe pressure changes that occur within the thorax during respiration and explain their effect on gas movement

- Describe different lung volumes and capacities and explain their significance
- Explain how respiration is controlled
- Describe pathological conditions of the respiratory system
- Compare basic mammalian respiration to strategies used by different animals (fish, birds, reptiles)

The Organ-ised Life of Animals: 10 Endocrine System

- Explain the difference between exocrine and endocrine glands
- Describe primary and secondary endocrine organs
- Describe the actions of the neurohormones released by the posterior pituitary
- Explain the general control and feedback mechanisms of hormone secretion
- Describe the different ways hormones act in combination
- Explain the role of the hypothalamus and pituitary
- Describe the hormones secreted by the thyroid and parathyroid glands
- Describe the hormones secreted by the adrenal gland and their primary functions
- Describe the main hormones secreted by the pancreas that are involved in glucose regulation

The Organ-ised Life of Animals: 11 Digestive System

- List in sequence the sections of the digestive tract
- Describe the microanatomy of the small intestine
- Compare the anatomy of a ruminant and non-ruminant digestive system
- Compare the physiology of a ruminant and non-ruminant digestive system
- Explain the functions of the accessory digestive organs
- Describe the functions of saliva, pancreatic enzymes and bile in digestion
- Identify the components of the avian digestive tract
- Explain the processes of motility, secretion, digestion and absorption
- Explain the process of digestion of carbohydrates, fats and proteins

The Organ-ised Life of Animals: 12 Renal System

- Describe the functions of the renal system and explain how it contributes to homeostasis
- Identify the kidneys, ureters, bladder, urethra, internal and external sphincters
- Identify within the kidney: the blood supply including renal artery and vein, the capsule, cortex, medulla, pyramids, renal papilla, calyx, pelvis, ureter, cortical and juxtamedullary nephrons

- Explain the Glomerular Filtration Rate
- Describe the intrinsic and extrinsic mechanisms that control blood pressure in the kidney
- Explain how the countercurrent mechanism works to enable the kidneys to concentrate urine
- Explain why excess H^+ may be produced and give examples of physiologic or pathologic acid-base disturbances
- Describe the micturition reflex
- Explain basic urinalysis results
- Identify the parts of the nephron responsible for filtration, reabsorption and secretion, and explain each of these processes
- Identify the following structures within a nephron: afferent and efferent arterioles, renal corpuscle, glomerulus, Bowman's capsule (and structure of the filtration barrier), proximal convoluted tubule, descending and ascending limbs of the loop of Henle, vasa recta, peritubular capillaries, distal convoluted tubule and the collecting duct

The Organ-ised Life of Animals: 13 Integumentary System

- Identify the major functions of skin
- Identify the layers and structures found in skin
- List the different layers in the epidermis, and describe the characteristics of the cells in these layers
- Describe the structure of the dermis and the hypodermis
- Explain how melanocytes produce melanin and why this is important
- Describe the structure of a hair follicle
- Explain the role of piloerection with respect to thermoregulation and communication
- List the two main types of skin glands (sebaceous and sweat) and their functions
- Identify the common cornified epidermal structures found in animals

The Organ-ised Life of Animals(High School)

The Organ-ised Life of Animals(High School): 01 Immune System

- Identify the physical and chemical barriers that form the first line of defense against pathogens
- Describe the types of white blood cells and their specific roles in innate immunity
- Explain the inflammatory response and phagocytosis as key processes in fighting infection

- Compare the functions of B cells and T cells in adaptive immunity
- Describe the structure and functions of antibodies including the five antibody classes
- Explain immunological memory and how vaccines create protection in animals
- Describe how innate and adaptive immunity work together during a bacterial infection
- Identify immune system malfunctions including allergies, autoimmune diseases, and immunodeficiency
- Analyze factors that affect immune function in animals including nutrition, age, stress, and genetics
- Apply One Health principles by identifying zoonotic diseases and their importance to animal and human health

The Organ-ised Life of Animals(High School): 02 Lymphatic System

- Describe the three primary functions of the lymphatic system and its relationship to circulatory and immune systems
- Trace the flow of lymph from lymphatic capillaries through vessels to lymphatic ducts and back to the bloodstream
- Explain how lymph moves through vessels without a central pump and why movement is essential for lymphatic health
- Compare the composition of lymph and blood and identify the role of lacteals in fat absorption
- Describe the structure and function of lymph nodes as filter stations and immune response centers
- Identify the locations of major lymph nodes in animals and explain their clinical significance in veterinary exams
- Distinguish between primary lymphoid organs (bone marrow and thymus) and secondary lymphoid organs (spleen, tonsils, MALT)
- Explain the functions of the spleen including blood filtration, blood cell storage, and immune responses
- Recognize lymphatic system disorders including lymphedema, lymphangitis, and lymphoma in animals
- Apply knowledge of lymphatic anatomy to understand disease diagnosis and veterinary physical examination techniques

The Organ-ised Life of Animals(High School): 03 Integumentary System

- Identify the three main layers of skin and describe their structural characteristics and functions

- Describe the five layers of the epidermis and explain the process of skin cell renewal
- Explain the structure and function of hair including growth cycles and thermoregulation
- Describe the structure and function of sebaceous glands and the importance of sebum
- Compare eccrine and apocrine sweat glands and their roles in thermoregulation and communication
- Identify keratinized structures including nails, claws, and hooves and explain their veterinary significance
- Explain how the integumentary system provides protection against physical damage, pathogens, and water loss
- Describe the types of sensory receptors in skin and their roles in detecting environmental stimuli
- Explain thermoregulation mechanisms including sweating, vasodilation, vasoconstriction, and piloerection in different species
- Recognize common integumentary disorders in animals including mange, skin cancer, and wound healing processes

Understanding Ingredients for Bakers

01: Grains and Flours

- Understand the Importance of Ingredients in Baking
- Identify and Describe the Key Categories of Baking Ingredients
- Analyze the Role of Ingredients in the Baking Process

02: Sweeteners in Baking

- Identify and describe sugar and other sweeteners used in the food service industry
- Describe the production of sugar and other sweeteners
- Describe the function of sweeteners in baking

03: Fats and Oils

- Identify and describe fats and oils used in the food service industry
- Describe the refining and production of fats and oils
- Describe the function of fats and oils in baking

04: Leavening Agents

- Identify and describe leavening agents used in the food service industry
- Describe the production of leavening agents
- Describe the function of leavening agents in baking

05: Eggs

- Identify and describe eggs and egg products used in the food service industry
- Describe the grading of eggs and egg products
- Describe the function of eggs and egg products in baking

06: Dairy Products

- Identify and describe milk and dairy products used in the food service industry
- Describe the production of milk and dairy products
- Describe the function of milk and dairy products in baking

07: Chocolate and Other Cocoa Products

- Identify and describe chocolate and cocoa products used in the food service industry
- Describe the production of chocolate and cocoa products
- Describe the function of chocolate and cocoa products in baking

08: Nuts and Seeds

- Identify and describe nuts and seeds used in the food service industry
- Describe the production of nuts, seeds, and nut and seed products
- Describe the function of nuts, seeds, and nut and seed products in baking

09: Thickening Agents

- Describe the production and properties of thickening agents
- Identify and describe thickening agents used in the food service industry
- Describe the function of thickening agents in baking

10: Water

- Identify and describe the types and properties of water used in the food service industry
- Describe the function of water in baking

11: Salt

- Describe the function of salt in baking
- Describe the production and properties of salt

12: Spices and Other Flavourings

- Describe the function of spices and other flavourings in baking
- Describe the production and properties of spices and other flavourings
- Describe the basic principles of taste and flavour
- Identify and describe spices and other flavourings used in the food service industry

13: Fruit

- Identify and describe fruits used in the food service industry
- Describe the production and properties of fruits
- Describe the function of fruits in baking

Water Services and Distribution Systems

Water Service Distribution Systems: 04 Describe Alternative Green Water Supply Systems

- Describe rainwater collection systems
- Describe grey water reuse systems
- Describe rainwater catchment and conveyance strategies
- Describe rainwater storage strategies
- Describe rainwater quality and treatment procedures
- Describe potable water protection
- Size pressurized systems
- Describe overflow provisions and management

Water Services & Distribution Systems: 01 Install Water Services

- Describe and identify parts of a municipal water supply system
- Describe the installation of pipes and components used in a municipal water supply system
- Use common terminology associated with water supply systems

Water Services & Distribution Systems: 02 Install Potable Water Distribution Systems

- Interpret the National Plumbing Code (NPC) Section 6, potable water systems
- Describe the building potable water supply system
- Size pipe for potable water service and distribution systems
- Describe the installation of piping for potable water service and distribution systems

Water Services & Distribution Systems: 03 Residential Irrigation Systems

- Describe and lay out residential irrigation systems
- Select and install irrigation components
- Test, service and commission an irrigation system

Working in the Food Service Industry

CUL07: CH01: Personal Attributes and Professionalism

- Describe roles and responsibilities in the workplace

- Describe personal attributes and professionalism in the workplace

CUL07: CH02: Food Service Occupations

- Describe food service occupations

CUL07: CH03: Employment Standards for B.C. Food Service Workers

- Describe the B.C. Employment Standards Act
- Describe the B.C. Human Rights Code

CUL07: CH04: Workplace Communication and Teamwork

- Describe the principles of effective communication
- Use interpersonal communication skills
- Work as a part of a team

CUL07: CH05: Organization and Self-Management

- Describe stress management techniques
- Demonstrate the basic principles of organization and time management
- Describe conflict resolution techniques
- Describe effective problem solving and decision making

CUL07: CH06: Job Search Skills

- Describe effective goal setting
- Prepare a short and long-term career plan
- Prepare a resumé

Workplace Safety in the Foodservice Industry

CUL08: CH01: Introduction

- Describe WorkSafeBC regulations in the workplace
- Identify and describe workplace hazards
- Describe basic emergency procedures
- Describe fire safety procedures and regulations
- Apply workplace safety procedures

CUL08: CH02: WorkSafeBC Regulations in the Workplace

- Describe WorkSafeBC regulations in the workplace

CUL08: CH03: Orientation and Training for Safety: An Essential Step

- Understand Orientation and Training for Safety: An Essential Step

CUL08: CH04: Roles and Responsibilities

- Understand Roles and Responsibilities

CUL08: CH05: Compensation and Benefits

- Understand Compensation and Benefits

CUL08: CH06: Workplace Hazards

- Understand Workplace Hazards

CUL08: CH07: Labels

- Understand Labels

CUL08: CH08: Warning Symbols (WHMIS 1988)

- Understand Warning Symbols (WHMIS 1988)

CUL08: CH09: Precautions When Using Hazardous Materials

- Understand Precautions When Using Hazardous Materials

CUL08: CH10: Emergency Procedures

- Understand Emergency Procedures

CUL08: CH11: Workplace Safety Procedures

- Understand Workplace Safety Procedures

CUL08: CH12: Key Takeaways and Activities

- Completion

Certify ED

Agricultural Science (Video & VR)

Agricultural Science - Unit 01 - The Foundations of Agriculture: Human Needs, Industry Branches, and Economic Impact

- Explain the three basic human needs and sources for food, clothing, and shelter.
- Define agriculture.
- Identify major agricultural milestones or inventions and analyzes their impact on modern life and agriculture.
- Describe the eight major branches of the agriculture industry.
- Differentiate between agricultural imports and exports and list examples of each.

- Identify the agricultural commodities within each region of the United States and the world.
- Explain the role of the different types of agribusiness in society and identify agribusinesses in the local community.
- Define agribusiness terminology and discuss the role of marketing in agricultural production.
- Explain how agribusiness financial records (i.e balance sheets, budgets, cash-flow statements, income statements, and profit and loss statements) are used.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in the agriculture industry.

Agricultural Science - Unit 02 - Navigating the Future of AFNR: Trends, Challenges, and Opportunities

- Evaluate and explain emerging trends and the opportunities they may create within the agriculture, food, and natural resources (AFNR) systems.
- Assess the economic impact of an AFNR system on a local, state, national, and global level.
- Examine historical and current data to identify issues impacting Agriculture, Food and Natural Resources (AFNR) systems.
- Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.
- Examine how current and past agricultural policies shape the industry.
- Discuss the importance of safety in agricultural occupations.

Agricultural Science - Unit 03 - Agricultural Safety: A Comprehensive Guide

- Identify hazards in agricultural education labs and work sites.
- Identify the common causes and prevention of accidents in agriscience operations.
- Identify proper disposal of hazardous waste materials and biohazards.
- Describe emergency procedures for basic first aid, CPR, chemical spills, and fire extinguisher use.
- Identify safety equipment and procedures for various agriculture related activities.
- Describe how to follow the safety procedures and appropriate behavior while working in the agriculture classroom, labs, and/or work sites.
- Evaluate the food safety responsibilities that occur along the food supply chain.

Agricultural Science - Unit 04 - Soil Science and Land Management

- Describe soil formation and soil composition.
- Differentiate between soil components.
- Explain the importance of soil ecosystems.
- Analyze the importance of slope, soil texture, erosion, and water movement in determining land capability and land use.
- Determine land class on a given site and select appropriate soil management practices.
- Describe preparations of land for efficient cropping.
- Identify the different kinds of soil tests used to evaluate its physical appearance, composition, pH, and moisture level.
- Identify the different kinds of chemical soil tests and soil amendments.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in agronomy.

Agricultural Science - Unit 05 - Plant Growth and Development: A Comprehensive Guide

- Describe the basic factors in plant growth.
- Identify plant life cycles and list examples.
- Label the major parts of the plant and explain the functions of each plant part.
- Compare and contrast photosynthesis, respiration, and transpiration and state their importance.
- Identify important floriculture and nursery/landscape plants.
- Explain the roles of essential plant nutrients for plant growth and reproduction.
- Explain the use of organic and inorganic fertilizers in plant production.
- Explain the basic principles of irrigation in plant production.

Agricultural Science - Unit 06 - Plant Biology: From Propagation to Pest Control

- Demonstrate sexual and asexual methods of various plant propagation techniques.
- Sequence the steps of pollination and fertilization.
- Demonstrate scarification, stratification, and planting seeds.
- Investigate the nature and properties of food, fiber, and by-products from plants.
- Outline the germination steps and list the conditions under which germination occurs.
- Investigate the impacts of various pests and propose solutions for their control.
- Identify and classify plant diseases.
- Explain the proper storage of pesticides.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in the plant science industry.

Agricultural Science - Unit 07 - Forestry, Natural Resources, and Livestock: A Foundation for Agriculture

- Describe the importance of the forestry and natural resource industry.
- Label various parts of trees and explain their functions.
- Demonstrate the ability to measure forest products and forest-related items.
- Identify basic equipment used in forestry.
- Identify important species of trees.
- Identify important species of wildlife in regards to agriculture.
- Explain the relationship between wildlife and the environment.
- Compare and contrast approved practices in managing wildlife.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in the forest and natural resources industry.
- Analyze the role, importance, and scope of the dairy and beef industries in modern agriculture.
- Identify and describe the major breeds within each livestock segment of the dairy and beef industry.

Agricultural Science - Unit 08 - Livestock Production: A Comprehensive Overview

- Analyze the role, importance, and scope of the pork industry in modern agriculture.
- Identify and describe major breeds within each livestock segment of the pork industry.
- Analyze the role, importance, and scope of the equine industry in modern agriculture.
- Identify and describe the major breeds within each livestock segment in the equine industry.
- Analyze the role, importance, and scope of the small ruminant animal industry in modern agriculture.
- Identify and describe major breeds within each livestock segment in the small ruminant animal industry.
- Define key terminology related to animal science and production practices.
- Distinguish between animal welfare and animal rights.
- Explain the basic anatomy and label basic external parts of production animals.
- Differentiate between major wholesale/retail meat cuts of beef, pork, lamb, and poultry and compare the value of various meat cuts.
- Provide for the care and welfare of animals.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in the animal industry.

- Explore the importance of alternative livestock in animal agriculture.

Agricultural Science - Unit 09 - Food Science and Technology: Principles and Applications

- Analyze the use of thermal energy, electrical energy, and compression in agriculture and describe the basic principles of each.
- Identify the government requirements and government agencies associated with food quality and food safety.
- Explain the importance of developing and maintaining sanitation standards.
- Explain the importance of food processing, preserving, and packaging.
- Explain the various types of processing, preserving, and packaging of foods using various methods and techniques.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in the food processing industry.
- Explain the physics concepts of work, power, simple machines, and mechanical advantage as they relate to agriscience.

Agricultural Science - Unit 10 - Agricultural Technology and Sustainability

- Trace the development of agricultural machinery.
- Select and demonstrate proper use of hand tools in agriculture.
- Describe how to perform basic service and maintenance recommendations on a tractor or lawn mower.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in the agricultural mechanics industry.
- Identify the agricultural commodities that can be converted into energy sources.
- Analyze the efficiency of renewable energy sources such as wind, solar, and biofuels.
- Explain current production practices such as organic, naturally raised systems, and conventional agricultural production with regard to their sustainability.
- Explain how intensive production systems such as aquaculture and vertical farming can maximize production while minimizing space requirements.
- Analyze the skills, education requirements, income, and advantages and disadvantages of careers in the agricultural environmental science industry.

Agricultural Science - Unit Sim

- Understand farm vehicle maintenance
- Understand crop leaf identification
- Understand administering a livestock injection

Animal Health and Disease Management

Animal Health and Disease Management: 01 Animal Nutrition

- Identify protein feed sources.
- Explain the role and importance of protein, carbohydrates, and fats in the diets of animals.
- List the sources of fats, minerals, vitamins, roughages, starches, sugars, proteins, etc., in animal rations.
- Discuss the role that minerals play in animal growth and development.
- Explain the differences in feed used by monogastrics and feed used by ruminants.
- Calculate the feed and water necessary for a group of livestock.
- Describe the types of ingestive behaviors in agricultural animals.
- List nutrients that are essential to the growth and development of animals.
- Describe the role water plays in supporting animal growth and development.
- Discuss the relationship between proteins and amino acids.

Animal Health and Disease Management: 02 Animal Anatomy & Physiology

- List and define the function of the organs of ruminant digestive systems.
- Identify parts, major organ, and functions, of animals using correct terminology.
- Identify the general function of the skeletal system and the major bones of the axial and appendicular skeleton.
- Identify the general function of the nervous system and the major organs.
- Identify the general function of the muscular system and major groups of muscles.
- Identify the general function of the digestive system.
- Differentiate between ruminants and non- ruminants (monogastric and hind gut fermentors) and the major organs.
- Identify the general function of the respiratory system and the major organs.
- Identify the general function of the urinary system and the major organs.
- Identify the general function of the reproductive system and both male and female organs.
- Compare and contrast external organs among animal species.
- List and define the function of the organs of monogastric digestive systems.

Animal Health and Disease Management: 03 Animal Husbandry & Management

- Analyze the visual characteristics of an animal product; select taxonomical classification terminology when referring to production animals.

- Understand animal behaviors as they relate to practicing safety precautions around animal restraint.
- Explain how breeds of livestock were developed.
- Identify and describe basic nonsurgical treatments and procedures in livestock.
- Analyze and document animal husbandry practices and their impact on animal welfare.
- Identify quality-assurance programs and procedures for animal production.

Animal Health and Disease Management: 04 Animal Health Diagnostics

- Practice safe procedures when working with animal-related equipment in laboratory and field settings.
- Define zoonosis and identify selected zoonotic diseases.
- Describe how diseases are spread and prescribe methods to limit infection.
- List examples of diseases caused by genetic disorders.
- Identify and give examples of diseases caused by improper nutrition.
- Identify signs and symptoms that are used to recognize and quarantine sick animals.
- Learn to diagnose common animal diseases.
- List and discuss agricultural animal diseases caused by microorganisms.

Animal Health and Disease Management: 05 Animal Health & Treatment

- Explain the conventional means of controlling parasites of agricultural animals.
- Describe how disease vaccines are developed and the success of their uses.
- Identify and describe basic surgical treatments and procedures in livestock.
- Identify tools used for basic surgical procedures in livestock.
- Examine proper injection methods and techniques in animals.

Animal Health and Disease Management: 06 Animal Breeding & Genetics

- Analyze the process of reproductive technologies such as artificial insemination, in vitro, multiple ovulation, embryonic transfer, sexed semen, and cloning.
- Explain different reproduction techniques associated with sheep, cattle, horses, goats, swine, and poultry.
- Investigate and explain why selection for muscling in animals is important.

Animal Health and Disease Management: 07 Animal Welfare & Ethics

- Analyze the perceptions of public opinion on animal-related issues.
- Examine how the proper care and use of animals can prevent abuse or mistreatment.
- Explain the laws governing animal care and use.

Animal Health and Disease Management: 08 Animal Behavior & Ethology

- Describe the importance of ethology in the production of agricultural animals.
- Differentiate between instinctive and learned behaviors of animals.
- Explain how animal behaviors are developed.
- Describe and identify social, dominant, flight, and protective behaviors in animals.
- Explain how the natural behaviors of agricultural animals can be used to provide the animals with a safer, more comfortable environment.

Animal Health and Disease Management: 09 Parasite Management

- Discuss how parasitism causes harm to the host animal.
- Identify parasites of agricultural animals and match the parasite to the host.
- Diagram the phases of a parasite's life cycle and identify how knowledge of life cycle can be used to control the parasite.

Animal Science (Video & VR)

Animal Science - Unit 01 - Animal Science: A Foundation for Understanding and Addressing Contemporary Issues

- Interpret the reasons given by some people for their objections to raising farm animals.
- Investigate the benefits to livestock producers to have healthy animals.
- Explain potential problems of animal production such as the continuous use of antibiotics.
- Describe the predominant sectors of the animal science industry.
- Outline the development of the animal industry and the resulting products, services, and careers.
- Explain trends and implications of future development of the animal systems industry.
- Describe animal science and the roles of animals in society.
- Analyze the perceptions of public opinion on animal-related issues.

Animal Science - Unit 02 - Understanding Animals: Taxonomy, Economics, Careers, and Safety

- Analyze the visual characteristics of an animal; select taxonomical classification terminology.
- Analyze the visual characteristics of an animal product; select taxonomical classification terminology when referring to production animals.
- Appraise and evaluate the economic value of animals for various applications in the agriculture industry.

- Locate and obtain information on animal-industry careers and career opportunities.
- Examine professional organizations and commodity groups in the animal industry and supporting organizations.
- Practice safe procedures when working with animal-related equipment in laboratory and field settings.
- Understand animal behaviors as they relate to practicing safety precautions around animal restraint.
- Define zoonosis and identify selected zoonotic diseases.

Animal Science - Unit 03 - Agricultural Animal Classification and OHSA Compliance

- Identify characteristics of animals that place them in different classifications.
- Explain how breeds of livestock were developed.
- Discuss OHSA as it relates to the animal industry.
- Explain how agricultural animals are classified according to their physical traits, breeds, uses, and scientific classification.
- Explain the use of the binomial system of classification.
- Categorize common and distinguishing characteristics of several agricultural animals (cattle, horses, sheep, goats, swine, and poultry).
- Distinguish between carnivores, omnivores, and herbivores and give examples.
- Identify characteristics that can be used to group animals.

Animal Science - Unit 04 - Animal Anatomy and Physiology

- Compare and contrast animal body systems types and functions among animal species.
- Identify parts, major organ, and functions, of animals using correct terminology.
- Identify the general function of the skeletal system and the major bones of the axial and appendicular skeleton.
- Identify the general function of the nervous system and the major organs.
- Identify the general function of the muscular system and major groups of muscles.
- Identify the general function of the digestive system.
- Differentiate between ruminants and non- ruminants (monogastric and hind gut fermenters) and the major organs.
- Identify the general function of the respiratory system and the major organs.

Animal Science - Unit 05 - The Foundations of Animal Biology: Organ Systems, Cell Division, and Sexual Reproduction

- Identify the general function of the urinary system and the major organs.
- Identify the general function of the reproductive system and both male and female organs.
- Compare and contrast animal cells among animal species.
- Identify the stages of body and sex cell division.
- Identify how the sex of an embryo is determined.
- Compare and contrast external organs among animal species.
- List and define the function of the organs of monogastric digestive systems.
- List and define the function of the organs of ruminant digestive systems.
- Correlate the functions of animal cell structures to animal growth, development, health, and reproduction.

Animal Science - Unit 06 - Ethology and Animal Behavior in Agricultural Production

- Describe the importance of ethology in the production of agricultural animals.
- Differentiate between instinctive and learned behaviors of animals.
- Describe the conditioning response and its use in animal production.
- Explain how animal behaviors are developed.
- Infer how unusual stimuli and surroundings affect animals.
- Examine how cattle view their surroundings and how that behavior is used to design cattle facilities.
- Describe and identify social, dominant, flight, and protective behaviors in animals.
- Investigate the social behaviors of agricultural animals.
- Identify dominant animals in a group.
- Discuss how dominant behavior contributes to natural selection.
- Analyze the types of sexual and reproductive behaviors in agricultural animals.
- Describe the methods used by agricultural animals to communicate.
- Describe the types of ingestive behaviors in agricultural animals.
- Explain how the natural behaviors of agricultural animals can be used to provide the animals with a safer, more comfortable environment.

Animal Science - Unit 07 - Animal Husbandry and Welfare: A Comprehensive Guide

- Examine how the proper care and use of animals can prevent abuse or mistreatment.
- Identify quality-assurance programs and procedures for animal production.

- Explain the early stages of animal development, from fertilization up through the formation of the blastula.
- Describe the gastrulation process and organogenesis processes that result in the formation of organs and growth in size.
- Describe animal growth and development over infancy, childhood, puberty, and adulthood.
- Analyze the process of reproductive technologies such as artificial insemination, in vitro, multiple ovulation, embryonic transfer, sexed semen, and cloning.
- Devise, implement, and evaluate safety procedures and plans for working with animals by species using information based on animal behavior and responses.
- Analyze and document animal husbandry practices and their impact on animal welfare.
- Explain different reproduction techniques associated with sheep, cattle, horses, goats, swine, and poultry.
- Describe the effects of hormones in the growth process.
- Explain the aging process in animals and distinguish between chronological and physiological age.
- Identify characteristics of twenty-four, forty-eight, and seventy-two hour old chick embryos.
- Sequence fat deposition in an animal's body.
- Investigate and explain why selection for muscling in animals is important.
- Analyze the circumstances of growth that affect production enterprises such as breeding efficiency, feed control, animal health, and profitability.

Animal Science - Unit 08 - Nutritional Requirements and Feed Management for Animals

- List nutrients that are essential to the growth and development of animals.
- Describe the role water plays in supporting animal growth and development.
- Discuss the relationship between proteins and amino acids.
- Identify protein feed sources.
- Explain the role and importance of protein, carbohydrates, and fats in the diets of animals.
- List the sources of fats, minerals, vitamins, roughages, starches, sugars, proteins, etc., in animal rations.
- Discuss the role that minerals play in animal growth and development.
- Explain the differences in feed used by monogastrics and feed used by ruminants.
- Calculate the feed and water necessary for a group of livestock.

Animal Science - Unit 09 - Parasites, Diseases, and Their Impact on Agricultural Animals

- Discuss how parasitism causes harm to the host animal.
- Identify parasites of agricultural animals and match the parasite to the host.
- Diagram the phases of a parasite's life cycle and identify how knowledge of life cycle can be used to control the parasite.
- Differentiate between internal and external parasites.
- Explain the conventional means of controlling parasites of agricultural animals.
- Describe how disease vaccines are developed and the success of their uses.
- Describe how diseases are spread and prescribe methods to limit infection.
- List examples of diseases caused by genetic disorders.
- Identify and give examples of diseases caused by improper nutrition.
- Identify plants that are poisonous to agricultural animals.
- Identify signs and symptoms that are used to recognize and quarantine sick animals.
- List and discuss agricultural animal diseases caused by microorganisms.
- Determine sources of disease-causing organisms in the environment.
- Learn to diagnose common animal diseases.

Animal Science - Unit 10 - Fundamentals of Livestock Care and Management

- Identify and describe basic nonsurgical treatments and procedures in livestock.
- Identify and describe basic surgical treatments and procedures in livestock.
- Identify tools used for basic surgical procedures in livestock.
- Examine proper injection methods and techniques in animals.
- Differentiate between animal control agencies and humane societies.
- Explain the laws governing animal care and use.
- Analyze the growth and development of the livestock industry as a global commodity.
- Investigate local, state, and national regulatory laws, industry regulations, and legislation for animal agriculture businesses.
- Identify and describe the primary government agencies involved with animal agriculture.
- Research new and emerging technologies in animal agriculture and their impact on the economy.
- Identify the different Animal ID Systems associated with sheep, cattle, horses, goats, swine, and poultry.
- Recognize the value of the food and agribusiness industry.

Animal Science - Unit Sim

- Understand livestock external anatomy
- Understand cow ID identification
- Understand primal cuts
- Understand livestock digestive system

Companion Animals

Companion Animals: 06. Animal Welfare & Legal/Regulatory Compliance

- Explain the requirements for labeling secondary chemical containers according to OSHA standards, including when a container must be labeled and the information required on the label.
- Identify the common causes of animal-related accidents in both home and professional environments, and describe the safety precautions necessary to prevent them.
- Apply anatomical directional terminology (dorsal/ventral, cranial/caudal, proximal/distal, medial/lateral) and identify the three anatomical planes to accurately describe locations on various animal species.
- Construct and deconstruct veterinary medical terms by identifying prefixes, root words, and suffixes to determine the meaning of common medical terminology used in animal healthcare.
- Interpret common veterinary abbreviations for anatomical locations (OD, OS, AU), diagnostic procedures (CBC, UA, EKG), treatments (BID, IM, PRN), and medical conditions (DM, URI, UTI) used in animal medical records.
- Identify physical, chemical, and zoonotic safety hazards in veterinary settings and apply the hierarchy of hazard controls (eliminate, substitute, isolate, engineering controls, administrative controls, PPE) to prevent workplace injuries and illnesses.
- Identify and describe the various safety precautions and procedures necessary to prevent physical, chemical, and biological hazards while working in a veterinary hospital or animal handling area.
- Explain the purpose of various types of personal protective equipment (PPE) and how to properly use them to prevent physical, chemical, and biological hazards in a veterinary or animal handling environment.
- Describe the proper procedures for handling, placing, and disposing of contaminated sharps and biohazard materials in accordance with OSHA's Occupational Exposure to Bloodborne Pathogens Standards.

- Describe the proper handling and use of sharps disposal containers, including their required features and placement, to prevent injury and infection.

Companion Animals: 01. Selection, Nutrition, and Management

- Identify at least five career pathways in veterinary science and explain the roles of veterinarians, veterinary technicians, and veterinary assistants in animal healthcare.
- Describe the three pathways of animal domestication (commensal, prey, and directed) and explain how selective breeding has allowed humans to develop different animal breeds for specific purposes.
- Explain the historical timeline of animal domestication, identify the purposes for which different animals were domesticated, and describe how the human-animal relationship evolved from utilitarian uses to companionship.
- Identify and correctly use common terminology for male, female, young, and groups of various animal species including livestock, companion animals, and wildlife.
- Identify common behavioral and physical changes in aging animals, recognize when different species reach their senior years, and explain appropriate care strategies for senior animals.
- Explain how homeostasis is maintained in mammals through negative and positive feedback loops, providing examples of each mechanism and identifying the key components (stimulus, sensor, control center, effector, and response).
- Calculate medication doses for companion animals using the basic dosage formula, convert between imperial and metric measurements, and determine the correct amount of tablets or liquid medication to administer based on an animal's weight.

Companion Animals: 02. Animal Anatomy, Physiology & Health

- Identify and correctly use anatomical directional terminology for companion animals, including dorsal/ventral, cranial/caudal, proximal/distal, and the three anatomical planes (median, dorsal, and transverse).
- Locate and identify the appropriate intramuscular injection sites for companion animals (triceps, lumbodorsal, quadriceps) and livestock (neck muscles, gluteal region), and explain why intramuscular injections are an effective method of medication administration.
- Locate pulse sites and venipuncture sites on various animals (dogs, cats, horses, cattle, sheep, and goats) and explain the purpose and importance of monitoring heart rate and drawing blood for medical assessment.

- Describe the six main functions of the skeletal system and explain how voluntary and involuntary muscles work together to support movement, protection, homeostasis, and circulation in animals.
- Identify components and explain the main functions of the circulatory and respiratory systems in animals.
- Identify the components and explain the main functions of the renal system (waste removal, water/chemical balance, hormone release, storage, elimination) and digestive system (ingestion, mechanical breakdown, propulsion, chemical digestion, absorption, elimination).
- Describe the functions of the reproductive system (offspring production, gamete creation, transport, hormones, nurturing), endocrine system (metabolism, growth, emotions, reproduction, sleep, heart regulation), and nervous system (sensory input, integration, response).
- Identify the bones of the axial skeleton (skull, vertebral column, thoracic cage) and appendicular skeleton (limbs and connecting bones) in mammals and compare skeletal structures across different species.
- Identify the three types of muscle tissue (skeletal, cardiac, smooth), explain the sliding filament mechanism of muscle contraction, and distinguish between voluntary and involuntary muscle movements.
- Identify the five types of connective tissue (loose, dense, cartilage, bone, blood) and explain their functions in supporting, protecting, and connecting body structures in animals.
- Identify the structures of the upper respiratory tract (nose, nasal cavity, sinuses, pharynx, larynx) and lower respiratory tract (trachea, bronchi, lungs, bronchioles, alveoli, diaphragm) and explain their roles in breathing and gas exchange.
- Identify the parts of a neuron (cell body, axon, dendrites), explain how the three types of neurons (sensory, motor, interneurons) transmit signals, and describe the main parts and functions of the brain (cerebrum, cerebellum, brainstem).

Companion Animals: 04. Handling, Grooming & Behavioral Care

- Distinguish between innate behaviors (reflex and instinctive) and learned behaviors (habituation, imprinting, association, imitation, innovation) and provide examples of how each type helps animals survive in their environment.
- Differentiate between normal and abnormal animal behaviors, identify causes of stereotypic behaviors, and explain how proper care and environment contribute to animal welfare.

- Identify warning signs of animal aggression (eye contact, showing teeth, growling, raised hair, ear position, tail movement) and explain the various causes of aggressive behavior in animals.
- Demonstrate proper animal restraint techniques, identify the five stress responses in animals (fight, flight, freeze, faint, fidget), and explain safety principles for both handlers and animals during restraint procedures.
- Demonstrate the three restraint positions (lateral recumbency, sternal recumbency, and dorsal recumbency) and explain when each method is appropriate for different veterinary procedures.
- Demonstrate safe restraint techniques for small dogs, including proper use of towels and Elizabethan collars, and identify special considerations for brachycephalic breeds during restraint procedures.
- Demonstrate five cat restraint methods (taco hold, burrito hold, football hold, snake hold, and scruffing) and explain when each technique is most appropriate for feline examinations and procedures.
- Demonstrate safe lifting and restraint techniques for large dogs, including proper body mechanics to prevent handler injury and methods for transitioning dogs between standing, seated, and lateral recumbency positions.
- Identify different types of leashes and restraint equipment (standard leash, slip lead, harness) and explain proper usage and safety considerations for each type based on the animal's needs and physical characteristics.
- Demonstrate safe procedures for placing dogs and cats into kennels and removing them, using appropriate equipment (slip leash, carrier, towel) while maintaining animal safety and minimizing stress.
- Demonstrate proper restraint techniques for accessing femoral, cephalic, jugular, and saphenous veins in cats and dogs, emphasizing safety protocols and stress-reduction methods during veterinary procedures.
- Identify when muzzles are appropriate, demonstrate proper muzzle training techniques, and explain how to select and fit different types of muzzles (basket, soft/sleeve, and gauze) for various situations.
- Identify and demonstrate various cat restraint methods (muzzles, harnesses, towel wrap, cat bag, gloves, scruff technique, squeeze cages) and explain when each method is appropriate for safe handling during routine care or emergencies.

- Identify and properly use grooming tools (combs, brushes, shampoos, deshedding tools, clippers, nail trimmers, otic solutions, dental care products) for dogs and cats while demonstrating safe grooming techniques.
- Demonstrate proper tooth brushing techniques for dogs and cats using appropriate tools (toothbrushes and pet-safe toothpaste) and explain how regular dental care prevents plaque, tartar, and systemic health complications.

Companion Animals: 05. Training and Enrichment

- Differentiate between types of human-animal interactions (pets/companion animals, service animals, emotional support animals, working animals) and explain the specific roles and benefits of each relationship type.
- Describe how Animal Assisted Therapy benefits individuals with cancer, PTSD, and special educational needs, and explain the specific therapeutic roles animals play in each treatment context.

Companion Animals: 07. Practical, Hands-On Experience

- Describe various diagnostic methods used in veterinary medicine, including hematology, cytology, fluid analysis, microbiology, serology, and toxicology, and explain how each method helps to identify and treat animal diseases.
- Identify the common symptoms of internal and external parasitic infections in companion animals, including helminths, protozoa, and ectoparasites.
- Describe the steps and purpose of a fecal flotation procedure, and explain why this diagnostic technique is more sensitive than a simple fecal smear for identifying parasitic worm eggs in animals.
- Describe various diagnostic methods for parasitic infections, including fecal sedimentation, fecal culture, the Baermann technique, and several blood tests such as the modified Knott's test and ELISA testing.
- Describe different treatment and prevention methods for common internal and external parasitic infections, including the use of topical, oral, and injectable medications.
- Describe the aseptic techniques used in veterinary surgery, including the methods for sterilizing surgical instruments and preparing the surgical staff to prevent the spread of infection.
- Identify and describe the function of common surgical instruments used in veterinary practice, including scalpels, surgical scissors, needle holders, tissue forceps, hemostats, retractors, towel clamps, spay hooks, and bandage scissors.

- Describe the proper procedures for cleaning and disinfecting a veterinary operating room and surgical instruments to prevent cross-contamination and ensure patient safety.
- Describe the required information for a prescription label on medications dispensed from a veterinary practice, and explain why clear and complete labeling is essential for a pet owner's understanding and a patient's safety.
- Describe the importance of vaccination schedules for dogs and cats, differentiate between core and non-core vaccines, and explain the proper procedure for drawing a vaccine into a syringe for administration.
- Describe the purpose of bandaging and splinting in veterinary care, identify the different layers of a bandage, and explain key techniques for proper bandage and splint application on a companion animal.
- Describe the various aspects of a urinalysis, including the physical and microscopic properties of urine, what different results may indicate about an animal's health, and the proper procedure for collecting a urine sample.
- Identify the necessary equipment for a blood draw, differentiate between the most common types of blood collection tubes based on their color and function, and explain the purpose of each for a veterinary blood analysis.
- Describe the steps and purpose of a fecal flotation procedure, and explain why this diagnostic technique is more sensitive than a simple fecal smear for identifying parasitic worm eggs in animals.
- Describe the health risks of radiation exposure in a veterinary setting and identify key safety practices and equipment used to minimize these risks for both staff and patients.
- Describe the proper procedures for storing and handling radiographic film, including the environmental conditions and equipment needed to prevent damage and ensure high-quality x-ray images.
- Describe the essential information required for properly labeling an x-ray film, differentiate between identification and positioning information, and explain the significance of accurate labeling for diagnosis in veterinary radiography.
- Identify the functions and components of a stethoscope, otoscope, and ophthalmoscope, and describe their proper use for examining animals during routine veterinary checkups.

Companion Animals: 08. Business & Leadership Components

- Describe the human-animal bond and explain its multifaceted benefits, including its positive impacts on human and animal physical, mental, and emotional health, as well as its historical evolution from a working relationship to a companionship-based one.
- Describe the various physical, mental, and social health benefits of human-animal interaction, and explain how these benefits are applied in different settings such as agriculture, companionship, and therapy.
- Identify and define the five stages of grief (denial, anger, bargaining, depression, and acceptance) as they relate to the loss of a companion animal, and describe how understanding these stages can help in the coping and healing process.
- Identify and describe a variety of career paths in veterinary science beyond clinical practice, including roles in research, education, diagnostics, consulting, and government, and outline the key responsibilities associated with each category.
- Differentiate between the roles and responsibilities of a veterinarian (DVM/VMD), a veterinary technician, and a veterinary assistant, and describe the educational pathways required for each career.
- Identify and describe key environmental, health, and ethical issues facing the modern animal industry, including the use of antibiotics, animal welfare, and sustainability, and recognize the roles of various regulatory agencies in addressing these challenges.
- Describe the educational pathways, responsibilities, and specializations for careers as a veterinary technologist and veterinary assistant, and understand the role of accreditation and licensure in these professions.

Culinary (Video and VR)

Culinary - Unit 01 - Culinary Fundamentals: Mastering Techniques and Tools

- Display understanding of cooking terminology.
- Demonstrate how to read and follow standard recipes.
- Demonstrate an understanding of the purpose of standardized recipes.
- Explain and establish mise en place.
- Identify, explain, and distinguish knife types and basic cuts.
- Demonstrate proper knife care.
- Demonstrate how to properly sharpen a knife using stone and steel.
- Demonstrate the ability to chop, mince, cube, dice, julienne, and/or slice

Culinary - Unit 02 - Kitchen Fundamentals: Equipment Organization, Safety, and Techniques

- Demonstrate how to organize kitchen equipment and use the tools and kitchen equipment appropriately.
- Demonstrate boiling and cooling eggs, secure the cutting board, peel eggs and cucumber, seed the cucumber and cut properly.
- Identify and demonstrate proper use of measuring devices.
- Identify large and small kitchen equipment.
- Demonstrate proper use and care of large and small equipment.

Culinary - Unit 03 - Culinary Safety and Sanitation: A Comprehensive Guide

- Identify basic principles of nationally recognized sanitation protocols.
- Identify and apply sanitary procedures in maintaining the facility, including proper waste disposal methods and recycling.
- Demonstrate proper food handling techniques (thermometer use; thawing methods; internal cooking temperatures) utilizing current industry safety and sanitation procedures for the agency having jurisdiction.
- Identify prevention methods, causes, and responses to workplace injuries.
- Identify and utilize first-aid procedures for accidents and injuries common to the food service industry.
- Demonstrate and utilize safety procedures related to prevention of slips, falls, burns, and fire; proper lifting and chemical use.

Culinary - Unit 04 - Culinary Safety and Sanitation: A Foundation for Food Excellence

- Demonstrate and utilize proper personal hygiene and personal health precautions (hand washing; use of gloves; grooming; proper hair restraints, closed-toe shoes, aprons, uniforms).
- Identify the HACCP (Hazard Analysis Critical Control Point) procedure during all food handling processes.
- Identify food allergen characteristics.
- Prepare and complete physical and perpetual inventory.

Culinary - Unit 05 - Culinary Fundamentals: Nutrition, Techniques, and Techniques

- Identify the basic food groups and how to make healthy food choices.
- Explain healthy cooking techniques.
- Explain the primary functions and food sources of major nutrients.

- Explain food and dietary trends, such as farm-to-table, organics, religious, and dietary concerns.
- Identify herbs and spices.
- Identify food products that are a result of fermentation.
- Convert weights and measurements using standard recipes.
- Demonstrate mastery of standard weights and measures used in the food service industry.
- Calculate guest check with tax and gratuity.
- Identify and prepare salads and dressings.
- Prepare salad and vinaigrette that are presented well and taste correct.

Culinary - Unit 06 - Culinary Foundations: Essential Techniques and Ingredients

- Prepare appetizers, and entrees.
- Prepare cold garnishes.
- Prepare sandwiches, spreads, and fillings.
- Identify fruits and vegetables.
- Prepare fruits and vegetables for cooking.

Culinary - Unit 07 - Fundamentals of Baking and Stocks

- Identify and prepare potato dishes.
- Identify and prepare pasta, grains, and legumes.
- Identify and explain the various leavening agents used in baking.
- Explain the leavening process in baking.
- Demonstrate and analyze the different functions of sugar and fats in baked goods.
- Prepare batters and doughs using appropriate mixing methods.
- Prepare standard dessert items.
- Identify the four essential components of stock.
- Prepare and flavor stocks using bones or base.

Culinary - Unit 08 - Thickening Agents and Sauces

- Identify and explain the principles of thickening agents used in food preparation.
- Prepare roux and thickening agents.
- Explain the characteristics of the grand/mother/leading sauces.
- Demonstrate the methods of preparation of sauce.

Culinary - Unit 09 - Fundamentals of Culinary Techniques and Ingredients

- Identify and describe the two classifications of soups.
- Demonstrate the methods of preparation of soups.
- Identify meat and poultry, including grade and inspection.
- Identify various cooking methods.
- Determine proper degrees of doneness.
- Identify market forms of fish and seafood.
- Identify various cooking preparations and methods.
- Identify and prepare breakfast starches.
- Identify and prepare breakfast meats.

Culinary - Unit 10 - Eggs, Dairy, and Industry Essentials

- Describe various job positions and chain of command in the food service industry.
- Identify and prepare different styles of eggs.
- Prepare a cheese omelet that appears and tastes correct.
- Identify and prepare cereals.
- Identify and use various dairy products, such as cheese, sour cream, butter, yogurt, creams, and milk.
- Prepare foods with a variety of cheese.
- Identify and exhibit professional behavior, appearance, and interviewing skills for the food service industry.

Culinary - Unit Sim

- Create unique dishes and put your culinary knowledge to the test

Veterinary Science (Video & VR)

Veterinary Science - Unit 01 - The Evolution of Veterinary Science: A Historical and Contemporary Perspective

- Define veterinary science.
- Identify key components in the domestication of animals.
- Choose current issues facing the animal industry today and describe the effect of each on society.
- Summarize the history of the veterinary science, companion animal, and livestock industry.
- Discuss the role of companion animals on the veterinary science industry.
- Discuss the role of livestock animals on the veterinary science industry.

- Explain the human and animal bond.
- List and describe the ways in which animals are a part of human lives.

Veterinary Science - Unit 02 - Human-Animal Bond: Health Benefits, Therapeutic Applications, and Veterinary Terminology

- Discuss the positive health effects on people resulting from their interaction with animals.
- Discuss programs that use human-animal interaction as a therapy tool.
- Discuss the stages of grief from an animal loss.
- Define common veterinary and medical terms, including directional terminology.
- Compile a list of prefixes, suffixes, and root words for veterinary medical terminology.
- Categorize species-related terminology.
- List and provide examples of abbreviations commonly used in veterinary medicine.

Veterinary Science - Unit 03 - Veterinary Science Careers: Exploring Opportunities, Safety, and Regulations

- Explore career opportunities in veterinary science.
- Investigate career opportunities in the veterinary science, companion animal, and large animal industry; also identify degree or credential needed to prepare for those careers.
- Investigate requirements necessary to earn and maintain Veterinary Assisting Certification.
- Recognize and avoid potential safety hazards, including physical, chemical, biological, and zoonotic.
- Examine proper safety precautions and procedures when working in the hospital and/or animal handling areas.
- Demonstrate knowledge of how to use personal protective equipment, including wearing gloves, goggles, facemasks, earplugs, aprons, gowns, caps, and shoe covers when needed.
- Demonstrate knowledge of OSHA regulations regarding the handling, placement, and disposition of sharps and biohazard material.

Veterinary Science - Unit 04 - Animal Safety and Behavior: Handling Hazardous Materials and Understanding Animal Reactions

- Handle and use disposable SHARPS containers in a safe manner.
- Explain the correct labeling of secondary containers with appropriate safety information.

- Practice safety precautions around animals, list the most common causes of animal related accidents.
- Identify instinctive and learned behaviors.
- Differentiate between normal and abnormal behavioral characteristics of animals.
- Recognize signs of aggressive animal behaviors.
- Describe behavioral changes due to aging.

Veterinary Science - Unit 05 - Handling and Restraining Animals for Veterinary Procedures

- Discuss the proper method for placing large animals in a stall, paddock, and trailer.
- Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans using the procedure-lifting, positioning, and restraining animals.
- Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans using the procedure-position an animal in sternal dorsal and lateral recumbency.
- Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans using the procedure-restraint of a small dog on an exam table.
- Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans using the procedure-restraint of a cat on an exam table.
- Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans using the procedure-restraint of a large dog on an exam table, lift table, and on the floor.
- Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans using the procedure-place a lead on a dog slip lead and standard leash.

Veterinary Science - Unit 06 - Handling and Restraining Animals for Veterinary Procedures Pt. 2

- Explain appropriate methods for placing and removing animals from kennels.
- Demonstrate restraint techniques for the femoral, cephalic, jugular, and saphenous veins of a dog and cat, including restraint for drug vaccine administration.
- Demonstrate the use of muzzle on a dog using commercial, leash, and gauze muzzles of appropriate size.

- Demonstrate currently accepted standards for restraint of the cat including towels, scruff technique, commercial muzzles, cat bags, leather gloves, and the squeeze cage.
- Recognize and implement common anatomical terminology for companion animals.
- Identify common intramuscular injection sites.
- Identify sites for measuring pulses and collecting blood samples.

Veterinary Science - Unit 07 - The Anatomy and Physiology of Companion Animals

- Identify and relate the bones of the skeleton to a live animal.
- Describe the functions of the reproductive, endocrine, and nervous systems.
- Describe the functions and types of muscle tissues found in companion animals.
- Describe the functions and types of connective tissues found in companion animals.
- Identify and describe the parts of the upper and lower respiratory tract.
- Identify and describe the parts of nerve cells and the brain.
- Describe the functions of the renal and digestive systems.
- Describe the functions of the skeletal and muscular systems.
- Describe the functions of the circulatory and respiratory systems.

Veterinary Science - Unit 08 - Homeostasis, Disease Diagnosis, and Prevention in Veterinary Medicine

- Interpret how the body seeks to maintain a state of homeostasis.
- Correctly operate the stethoscope, otoscope, and ophthalmoscope.
- Summarize the principles of infectious disease, including its identification, prevention, and treatment.
- Describe the major classifications of diseases and their underlying causes.
- Explain the methodology of diagnosing diseases.
- Describe the components of disease prevention and their application in a clinical setting.
- Describe the general clinical signs of an animal with a parasite infestation.
- Diagram the life cycles of internal and external parasites.
- Properly use a microscope to scan for parasite eggs.

Veterinary Science - Unit 09 - Laboratory Techniques and Animal Care

- Perform common laboratory procedures for diagnosing parasites.
- Summarize the modes of transmission, life cycle, including the procedures commonly used to determine the effect on the host and treat for parasitic infestation.

- Clean, prepare, and sterilize surgical instruments, equipment, and supplies, and operate autoclave.
- Identify common instruments used in surgical procedures.
- Select, identify, and use equipment for grooming procedures, such as trimming nails, bathing, and cleaning ears.
- Perform post-surgical clean up.
- Calculate medication amounts for animals.
- Properly label medications.
- Demonstrate completing vaccinations schedules and reading and filling syringes.

Veterinary Science - Unit 10 - Veterinary Procedures and Patient Care: Essential Techniques and Safety Protocols

- Demonstrate bandaging an animal.
- Demonstrate brushing teeth of an animal.
- Collect voided urine samples and examine them using techniques to measure their physical properties, sediment, and specific gravity.
- Prepare supplies for blood collection and identify common blood tubes used in veterinary medicine.
- Collect voided fecal samples and examine them for abnormalities using the direct smear, flotation, and centrifugation methods.
- Explain the proper handling of radiographic film including safe light use.
- Demonstrate the appropriate labeling of a radiograph including date, patient name, view or side of patient, machine settings, and film developing.
- Explain the correct use of personal protection equipment including lead-shielded gowns, lead gloves, lead thyroid shield, lead glasses, and other lead protective wear. Discuss restrictions from radiation exposure protocols for pregnant women and minors.

Veterinary Science - Unit Sim

- Identify tools and equipment
- Wrap a general surgical pack
- Read and fill syringes

Core-LX

Companion Animals

1.1-3 The Human-Animal Bond: Evolution, Medicine, and Society

- A scientific understanding of animal domestication and evolution
- Historical perspective on the development of animal care and medicine
- Critical thinking skills about contemporary social and ethical issues around pets and the pet industry
- Economic literacy regarding of the pet industry
- Appreciation for the deep, complex relationship between humans and companion animals

2.1-4 The Human Animal Bond

- Understand the History and Purpose of Animal-Assisted Therapy (AAT)
- Explain the Physiological and Psychological Effects of Human-Animal Interaction
- Recognize the Emotional Bond Between Humans and Animals
- Analyze Coping Strategies for the Loss of a Pet

Types of Companion Animals

- Dogs: Recognize the 7 AKC breed groups and their associated health risks.
- Dogs: Provide life-stage appropriate nutrition while avoiding the 10 toxic foods.
- Dogs: Identify emergency signs like bloat and breed-specific conditions like brachycephalic syndrome.
- Cats: Distinguish between major breed categories and their grooming needs.
- Cats: Provide balanced commercial diets with fresh foods while avoiding toxic foods.
- Cats: Recognize and manage FLUTD, kidney disease, hyperthyroidism, and diabetes.
- Small Mammals: Differentiate species and understand their social housing requirements.
- Small Mammals: Provide species-specific diets including unlimited hay for rabbits and vitamin C for guinea pigs.
- Small Mammals: Recognize GI stasis emergencies and species-specific conditions like wet tail.
- Birds: Classify pet birds by size and understand their lifespan expectations.
- Birds: Provide balanced commercial diets with fresh foods while avoiding toxic foods.
- Birds: Detect early illness signs and manage conditions like feather plucking and egg binding.

Veterinary Vocabulary

- nan

Pointful Education

Agriscience I

Agriscience_01 00: Start Here

- Completion

Agriscience_01 01: Introduction to Agriculture in the Global Economy

- Evaluate and explain emerging trends and the opportunities they may create within the AFNR systems
- Assess the economic impact of an AFNR system on a local, state, national and global level
- Examine historical and current data to identify issues impacting AFNR systems
- Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment
- Identify careers in Agriculture in the global economy

Agriscience_01 02: Safety, Scientific and Technological Principles of Agriscience Issues

- Identify the common causes and prevention of accidents in agriscience operations
- Extract and utilize pertinent information from a container label and/or Safety Data Sheet (SDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations
- Describe emergency procedures for basic first aid, CPR, chemical spills, fire extinguisher use
- Employ scientific measurement skills.
- Demonstrate safe and effective use of common laboratory equipment
- Identify the parts and functions of plant and animal cells
- Describe the phases of cell reproduction
- Implement the scientific method and science process skills through the design and completion of an agriscience research project
- Interpret, analyze, and report data
- Investigate DNA and genetics applications in agriscience including the theory of probability
- Identify proper disposal of hazardous waste materials and biohazards

- Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.)

Agriscience_01 03: Environmental Principles in the Agricultural Industry

- Research how different climactic and geological activity influences agriculture
- Describe various ecosystems as they relate to the agriculture industry
- Describe the environmental resources (soil, water, air) necessary for agriculture production
- Identify regulatory agencies that impact agricultural practices
- Identify regulatory agencies that impact agricultural practices
- Identify conservation practices related to natural resources

Agriscience_01 04: Scientific Skills in Plant Science

- Identify and describe the specializations within the plant science industry
- Categorize plants based on specific characteristics according to industry and scientific standards
- Examine the processes of plant growth including photosynthesis, respiration, transpiration, absorption, transfer, storage, reproduction, etc.
- Identify the nutrients required for plant growth from the periodic table and explain their functions
- Analyze information from a fertilizer label
- Propagate and grow plants through sexual and/or asexual reproduction
- Investigate the impacts of various pests and propose solutions for their control
- Investigate the nature and properties of food, fiber, and by-products from plants
- Explore career opportunities in plant science

Agriscience_01 05: Scientific Skills in Animal Science

- Explain the economic importance of animals and the products obtained from animals
- Analyze commercially important livestock breeds in Florida
- Illustrate correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species
- Compare and contrast animal welfare issues
- Investigate the nature and properties of food, fiber, and by-products from animals
- Explore career opportunities in animal science

Agriscience_01 06: Agriscience Tools, Equipment, and Instruments

- Select and demonstrate proper use of hand tools in agriculture

- Operate service and maintain agriscience equipment, and instruments
- Analyze factors of owning a small farm or agribusiness
- Examine how communication plays a critical role in leading a small farm or agribusiness
- Utilize a record-keeping system to collect, interpret, and analyze data
- Enhance oral communications through telephone, interview, and presentation skills
- Enhance written communication by developing resumes and business letters
- Demonstrate interpersonal (nonverbal) communication skills
- Demonstrate good listening skills

Agriscience_01 07: Leadership and Citizenship Skills

- Identify and describe leadership characteristics
- Identify opportunities to apply acquired leadership skills
- Identify and demonstrate ways to be an active citizen
- Participate in community-based learning activities
- Demonstrate the ability to work cooperatively
- Conduct formal and informal meetings using correct parliamentary procedure skills
- Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations
- Develop both a leadership and a career development plan utilizing SMART goals that include 5-, 10-, and 20-year benchmarks

Agriscience_01 08: Food Safety and Handling Procedures

- Demonstrate proper safety precautions and use of personal protective equipment
- Evaluate the food safety responsibilities that occur along the food supply chain
- Explain techniques and procedures for the safe handling of food products
- Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation)
- Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply
- Explore career opportunities in food safety in agriculture

Agriscience_01 09: Course Wrap-up/Final Exam

- Completion

Agriscience II

Agriscience_02 00: Start Here

- Completion

Agriscience_02 01: The Agriscience Industry, Health and Nutrition

- Describe nutritional requirements of animals
- Describe a livestock animal's digestive system
- Investigate career opportunities in agriscience industries
- Describe training requirements for entry and advancement in agriscience careers
- Demonstrate proper methods to clean and disinfect animal equipment and facilities
- Explain proper disposal of animal waste with regards to sanitation, economics, and environmental implications

Agriscience_02 02: Livestock Reproduction

- Examine livestock and poultry reproductive anatomy
- Explain the reproductive cycles of commercially important animals
- Compare and select appropriate breeding methods for different agricultural enterprises
- Describe approved care for newborn animals
- Identify procedures in animal production: compare & contrast desirable characteristics of breeding and market animals
- Identify procedures in animal production: evaluate wholesale cuts of beef, pork, lamb, and poultry

Agriscience_02 03: Livestock Management

- Describe methods of animal identification
- Describe methods of restraining, loading, handling, and transporting animals safely
- Develop procedures for exhibiting animals: demonstrate the procedures for preparing, maintaining, and handling livestock
- Develop procedures for exhibiting animals: compare and contrast appropriate livestock evaluation criteria
- Develop procedures for exhibiting animals: prepare appropriate registrations, shipping, and health certificates required for exhibiting or marketing animals
- Develop procedures for exhibiting animals: demonstrate appropriate grooming and showmanship skills

Agriscience_02 04: Plant Production Systems Part I

- Compare different plant production systems (seed, cutting, air layer, and tissue culture)
- Propagate, transplant, and grow plants
- Select and prepare a site and/or a seedbed for planting
- Identify methods of pruning plants to achieve desired growth and to maintain health
- Identify types of hydroponic systems; identify methods used in hydroponic systems

Agriscience_02 05: Plant Production Systems Part II

- Interpret information on a fertilizer label
- Compare sources and forms of nutrients
- Determine methods of applying fertilizer materials
- Collect soil samples to determine nutrient levels
- Test soil for pH and soluble salts

Agriscience_02 06: Agribusiness

- Use and maintain hand tools and power equipment (e.g., power saws, welders)
- Describe the maintenance and service of small engines
- Introduce science principles as applied in selected mechanical applications (e.g. hydraulics, and internal combustion)
- Apply principles of agribusiness finance: Identify components of balance sheets and income statements
- Apply principles of agribusiness finance: Identify major sources of credit for agribusiness
- Apply principles of agribusiness finance: Complete a business loan application
- Apply principles of agribusiness finance: Maintain and interpret agribusiness financial records including depreciation, inventory, and budgets

Agriscience_02 07: Global Economy Part I

- Assess the agricultural impact on the US gross national product and the total global economy
- Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses
- Identify and describe the primary government agencies involved with agriculture
- Research new and emerging technologies and their impact on agribusiness and the economy

Agriscience_02 08: Global Economy Part II

- Describe the value of the food and agribusiness industry
- Examine the scope of career opportunities in agriculture and the importance of the agriculture industry to the economy
- Define and explore agriculture and agribusinesses and their role in the economy
- Evaluate and explore the agribusiness career opportunities in agriculture
- Compare how key organizational structures and processes affect organizational performance and the quality of products and services

Agriscience_02 09: Course Wrap-up/Final Exam

- Completion

Agriscience III

Agriscience_03 00: Start Here

- Completion

Agriscience_03 01: The Agriscience Industry

- Identify and describe the importance of professional and trade organizations
- Examine and interpret trade journals and academic research in the agriscience industry
- Describe the five basic ways American business is organized
- Identify and distinguish between the characteristics of each method of doing business
- Evaluate the advantages and disadvantages provided by each business method
- Evaluate how cooperative principles and practices differentiate cooperatives from other businesses: Complete a job application

Agriscience_03 02: Agriculture Cooperatives and Agribusiness Finance

- Define a cooperative
- Explain the history of cooperative principles and practices
- Describe the five areas that classify cooperative structure
- Identify and distinguish between the five types of cooperative structure and their functions
- Explain the purposes and structures of contracts, leases, deeds, and insurance policies
- Complete a State FFA Degree or Proficiency Applications
- Identify the tax obligations of agricultural businesses. (ex. Property tax, intangible taxes, income taxes)

Agriscience_03 03: Animal Health and Nutrition

- Recognize, describe and demonstrate prevention and treatment of common animal diseases, disorders, and pests
- Read, interpret, and demonstrate correct uses of pesticides, medication, and other additives according to their labels
- Formulate and compute least-cost feed rations
- Select and apply growth stimulators and implants
- Determine feeding rates and methods of feeding animals

Agriscience_03 04: Plant Production Services

- List the leading local (community) varieties of commonly grown crops for commercial production
- Recommend varieties of local commercial plants and field crops
- Identify the recommended planting rate, spacing requirements, and growth times for common garden crops
- Describe the operation of and adjustment of plant production equipment

Agriscience_03 05: Plant and Crop Fertilization and Irrigation

- Develop fertilization schedules and calculate fertilizer rates for plants
- Identify common nutrient-deficiency symptoms in plants
- Calibrate fertilization equipment and fertilize plants
- Recognize soil and plant conditions indicating irrigation needs and develop an irrigation schedule
- Compare and select irrigation equipment and methods

Agriscience_03 06: Plant Pest Control

- Compare and contrast common plant pests and their damages
- Diagram life cycles of insects, pests, and diseases
- Interpret the procedures and requirements for obtaining a restricted-use-pesticide operator's license
- Select, mix, and apply a no-restricted chemical according to the label and local, state, federal, and EPA regulations
- Describe biological, chemical, and cultural methods of controlling plant pests
- Develop Best Management Practices for pest management

Agriscience_03 07: Maintenance of Facilities, Tools, and Equipment

- Discuss basic facility maintenance, installation, or repair (e.g., welding, electricity, plumbing, fencing, construction)
- Safely operate, maintain, service, and repair equipment
- Install, operate, maintain, and repair irrigation equipment
- Develop Best Management Practices (BMP) for water use

Agriscience_03 08: Harvesting

- Describe procedures for harvesting products (produced by a marketing program)
- Collect and interpret market reports and identify market outlets for agricultural products (produced by program)
- Organize a marketing program for an agricultural product (produced by program or student)
- Assess kinds and types of storage facilities for agricultural products (produced by program)
- Grade, treat, pack, and/or store harvested products (produced by program)

Agriscience_03 09: Course Wrap-up/Final Exam

- Completion

Architecture & Construction

Almon, Inc.

Electrical

Basic Electrical 1

- Identify basic electrical safety hazards and solutions.
- Identify proper use of personal protective equipment (PPE) according to NFPA 70E Standards.
- Explain the basic principles of what electricity is, how it works, and how to measure it.
- Identify and apply various circuit theorems, including Ohm's Law and the equation to determine power in an electrical circuit.
- Explain amperage, power, voltage, and resistance.
- Identify materials as insulators, conductors, and semi-conductors

- Describe operating characteristics of electrical components including batteries, wires, connectors, grounds, fuses and circuit breakers, switches, resistors, capacitors, diodes, transistors, pressure sensors, temperature sensors, proximity sensors, instruments, and controller and busses.
- Install various switching arrangements.
- Test and troubleshoot completed installation.
- Describe operating characteristics of electromechanical components including alarms and buzzers, relays, solenoids, transformers, electrical motors, generators, and alternators.

Basic Electrical 2

- Identify characteristics and different kinds of electrical circuits, including machine parked, interlock circuits, start circuits, run circuits, and charging circuits
- Identify and interpret schematic diagrams
- Identify and interpret wire harness diagrams

Basic Electrical 3

- Identify characteristics, uses, and connections of meters and measuring devices
- Understand how to troubleshoot issues

Electrical Schematics

- Understand the fundamental purpose and use of a schematic.
- Interpret a basic electrical schematic.
- Identify electrical schematic symbols.

HVAC and Shop Safety

HVAC - Tractor

- Understand the impact of heat and pressure on HVAC systems.
- Recognize sequential flow in an HVAC system.
- Identify HVAC components based on their role/function within the system.

Shop Safety

- Outline procedures, precautions, and equipment that ensure a safe work environment.
- Mitigate factors that lead to unsafe environments.

Tools

Basic Hand Tools

- Examine tools to verify they meet safety standards.
- Select tools based upon the job at hand.
- Differentiate between tools by the features and functionality.

Precision Measuring Tools

- Recognize safety issues involved with precision measuring tools.
- Identify basic precision measuring tools.
- Comprehend various types of precision measuring tools.
- Understand fundamentals of proper use of precision measuring tools.
- Understand proper care techniques for precision measuring tools.

Certify ED

Carpentry (Video & VR)

Carpentry - Unit 01 - Fundamentals of Carpentry Safety and Tool Use

- Explain the purpose of the Occupational Safety and Health Administration (OSHA) and workplace safety procedures.
- Explain the safety rules for operating all hand and power tools.
- Demonstrate the safe transportation, handling, and storing of materials.
- Demonstrate the inspection, use, and care of personal protective equipment.
- Identify and describe the use of various hand and power tools.
- Demonstrate proficiency in the safe use of hand and power tools.
- Read and use carpenter's measuring tools.
- Read and use carpenter's layout and marking tools.

Carpentry - Unit 02 - Fundamentals of Carpentry: Tools, Drawings, and Building Codes

- Describe how to clean and care for tools and equipment.
- Recognize and identify basic construction drawing terms, components, and symbols.
- Recognize different classifications of construction drawings.
- Interpret and use drawing dimensions and architectural scales.
- Draw or sketch basic floor plans and/or shop drawings.
- Relate information on construction drawings to actual locations on the print.
- Estimate material quantities based on construction drawings.

- Explain the purpose and importance of the building codes.
- Identify green building practices and its importance in successful building projects.
- Establish building and final grade elevations.

Carpentry - Unit 03 - Lumber Selection and Quality Assessment

- Identify the grades and species of lumber and their appropriate uses.
- Identify the actual and nominal sizes of lumber.
- Identify the grades of plywood and wood products.
- Identify defects and blemishes that affect the durability and strength of lumber.
- Explain the effects of temperature extremes, chemical reaction and moisture content on building materials.
- Install, brace, align, and remove the forms used to form footers and foundations.

Carpentry - Unit 04 - Foundations and Footings: Engineered Lumber, Concrete, and Construction Techniques

- Explain the uses of various types of engineered lumber.
- Identify various types of footing and foundations.
- Identify the different types and characteristics of concrete used in foundations and footings.
- Discuss various footings used to support different types of foundation.
- Describe how a gridline is used to establish footings and foundations.
- Layout and construct a building foundation.
- Install, brace, align, and remove the forms used to form footers and foundations.

Carpentry - Unit 05 - Floor Framing and Subfloor Construction

- Identify and describe floor-framing members including subfloor.
- Identify supports for structures, including sills, columns, beams, and girders.
- Identify various types of joists and openings, including joists for a cantilevered floor.
- Identify various types of bridging.
- Identify various types of subfloors, applying fastening techniques.
- Cut and install framing members for a floor system.
- Identify framing members used in wall and partition construction.

Carpentry - Unit 06 - Wall Framing and Insulation

- Identify various wall sheathing and/or diagonal bracing systems used in exterior walls.
- Identify and describe various insulation materials, moisture and air barrier materials and systems.

- Cut and install framing members for a wall system.
- Lay out wall lines and partition locations on a floor.
- Lay out walls for studs, doors, and windows.
- Identify studs, trimmers, cripples, headers, and fire stops to length.
- Identify Ts, corners, and headers.

Carpentry - Unit 07 - Roof Framing and Construction

- Identify the different type of roof systems.
- Identify the roof framing members used in gable and hip roofs.
- Identify the methods used to calculate the length of a rafter.
- Identify the various types of trusses used in roof framing.
- Use a rafter framing square, speed square, and calculator to lay out a roof system.
- Identify various types of sheathing used in roof construction.
- Frame a gable roof with vent openings.
- Frame a roof opening.

Carpentry - Unit 08 - Roof Framing, Stair Construction, and Material Estimation

- Erect a gable roof using trusses.
- Estimate the materials used in framing and sheathing a roof.
- Cut framing members for a roof system.
- Identify the types of stair systems.
- Identify the parts of a stair system.
- Calculate the number of treads and risers for a stair system.
- Lay out, cut, and assemble an exterior and/or interior stair system.

Carpentry - Unit 09 - Window and Door Installation

- Identify various types of fixed, sliding and swinging windows.
- Identify various materials and techniques used to install a window.
- Install a pre-hung window in accordance with manufacturer's installation instructions.
- Identify the common types of doors and explain how they are constructed.
- Identify various materials and techniques used to install a door.
- Install a pre-hung door.
- Identify various materials and techniques used to install cornice and trim.
- Install cornice and trim.

Carpentry - Unit 10 - Siding and Cabinetry Installation

- Identify various types of siding.
- Identify various materials and techniques used to install siding.
- Calculate, lay out, and install siding using a builder's level to establish a level chalk line for the starting course of vinyl siding.
- Identify various materials and techniques used to installing cabinets.
- Install cabinets.
- Install hardware such as hinges, catches, pulls, knobs and guides on assembled cabinets.
- Install fasteners and drawers.

Carpentry - Unit Sim

- Understand getting familiar with tools
- Understand housing foundations

Construction Safety (OSHA) (Video & VR)

Construction Safety (OSHA) - Unit 01 - OSHA: A Foundation for Construction Safety

- Explain why OSHA was created and the mission statement of the administration.
- Demonstrate an understanding of the role of OSHA in job site safety.
- Describe the basic topics OSHA Standards cover in the construction workplace.
- Define the responsibilities of the employer to adhere to OSHA regulations.
- Identify worker rights and responsibilities provided by OSHA.
- Describe how OSHA inspects workplaces and job sites to ensure standards are being followed.

Construction Safety (OSHA) - Unit 02 - OSHA Reporting and Enforcement Procedures

- Identify ways that employees can report safety hazards.
- Identify the procedures that OSHA uses to respond to reports of safety hazards.
- Explain how OSHA protects those that report about a violation of safety on the job site.
- Identify the types of inspections and describe how each are carried out.
- Classify who is covered under OSHA and who is not covered under the OSH Act.

Construction Safety (OSHA) - Unit 03 - Safety Fundamentals: Building a Strong Construction Culture

- Demonstrate an understanding of the role that safety plays in the construction industry.
- Explain the idea of safety culture and its importance in the construction industry.

- Demonstrate an understanding of the meaning of job site safety.
- Describe the items that are included in Personal Protective Equipment (PPE) with regard to the safety and health regulations for construction.
- Demonstrate the use and care of appropriate personal protective equipment (PPE).
- Exhibit knowledge of how to properly put on and remove personal protective equipment, such as hard hats, safety goggles, face shields, gloves, and hearing protection.
- Exhibit knowledge of how to properly put on and remove personal protective equipment, such as masks, respirators, and personal fall protection.

Construction Safety (OSHA) - Unit 04 - Personal Protective Equipment (PPE) Requirements in Construction

- Identify the specifications for footwear on the job site.
- Explain the requirements for electrical protective equipment according to OSHA standards.
- Explain OSHA's requirements for hard hats on the job site.
- Describe OSHA's standard for when employees must use hearing protection.
- Identify when eye and face protection should be used according to OSHA protocols.
- Describe instances in construction when respiratory protection would be required by OSHA.
- Define and recognize when lifelines, safety belts, and lanyards would be used for safety on the job site.
- Explain when a safety net would be required on the job site to adhere to OSHA standards.

Construction Safety (OSHA) - Unit 05 - Slip, Trip, and Fall Hazards: Prevention and Mitigation in Construction

- Identify and evaluate slips, trips, and falls hazards on the job site.
- Describe the impact of slips, trips, and falls on the job site.
- Recognize key slip, trip, and fall terminology.

Construction Safety (OSHA) - Unit 06 - Ladder Safety and Fire Protection in Construction

- Identify the standards for a fixed ladder on the job site.
- Explain the standards for a portable ladder located on the job site.
- Identify the proper ladder climbing technique described by OSHA standards.
- Define the importance of a fire protection program.

- Identify the type and location of equipment that would be present on the job site to fight a fire.

Construction Safety (OSHA) - Unit 07 - Electrical Safety and First Aid in Construction

- Identify the signage that is to be used to alert to hazards/dangers on the job site with specification to color and size.
- Explain why improper grounding violates OSHA standards for safety.
- Identify procedures for lock-out/tag-out.
- Explain OSHA's safety standards for operating and maintaining all power tools.
- Define safe work procedures to use around electrical hazards.
- According to OSHA's standards, identify items that would be located in a first aid kit on a construction job site.
- Explain the first aid training requirements for job site employees.

Construction Safety (OSHA) - Unit 08 - Materials Handling, Hazard Recognition, and Construction Site Safety

- Demonstrate knowledge of the importance of proper materials handling.
- Explain the appropriate safety procedures associated with materials handling.
- Define hazard recognition and risk assessment techniques.
- Identify struck-by hazards and demonstrate safe working procedures and requirements.
- Identify caught-in-between hazards and demonstrate safe working procedures and requirements.
- Explain hazards caused by environmental elements, welding and cutting, and confined spaces.
- Explain construction site hazards dealing with work around cranes, loaders, excavation equipment, forklifts, etc.

Construction Safety (OSHA) - Unit 09 - Tool Safety in Construction: OSHA Standards and Practices

- Describe the OSHA standards as they relate to hand tools used on construction job sites.
- Describe the OSHA standards as they relate to power tools used on construction job sites.
- Demonstrate the knowledge of basic rigging equipment and safety.

- Describe the OSHA standards as they relate to motorized and mechanized equipment on construction job sites.
- Explain the OSHA standards as they relate to abrasive wheels and tools used on construction job sites.

Construction Safety (OSHA) - Unit 10 - OSHA Standards for Construction Site Tools and Equipment: Woodworking, Jacks, Welding, Excavation, and Masonry

- Identify the OSHA standards as they relate to woodworking tools used on construction job sites.
- Explain the OSHA standards as they relate to jacks and hydraulic equipment used on construction job sites.
- Describe the OSHA standards as they relate to welding tools and equipment used on construction job sites.
- Identify the OSHA standards as they relate to excavation tools and equipment used on construction job sites.
- Identify the OSHA standards as they relate to masonry tools and equipment used on construction job sites.

Construction Safety (OSHA) - Unit Sim

- Understand focus four: hazards in construction
- Understand personal protective equipment
- Understand health hazards in the construction

Electrical (Video & VR)

Electrical - Unit 01 - Electrical Power Generation and Safety

- Describe the various ways that electricity is produced.
- Explain the magnetic properties of circuits and devices.
- Explain the principles of electromagnetism.
- Identify the licensure requirements for electrical occupations.
- Describe the importance of following the local, state, and national electric codes.
- Read and interpret basic electric codes, plans, and specifications.
- Read and interpret electrical blueprints and wiring diagrams.

Electrical - Unit 02 - Electrical Safety and Emergency Procedures

- Explain the National Fire Protection Association (NFPA) 70E and how it relates to job safety for electricians.

- Explain emergency procedures to follow in response to workplace accidents.
- Create a disaster and emergency response plan for specific incidences.
- Identify the procedures for lock-out/tag-out.
- Explain the importance of CPR (Cardio Pulmonary Resuscitation) and first aid.
- Discuss the types of protective clothing used by electricians.
- Discuss the importance of grounding.

Electrical - Unit 03 - Fundamentals of Electrical Circuits

- Explain the difference between conductors and insulators.
- Explain the difference between direct current (DC) and alternating current (AC).
- Explain the difference between single-phase and three-phase systems of AC electrical power.
- Define and describe voltage, current, resistance, and power.
- Measure voltage, current, and resistance using industry-standard electrical measuring devices.
- Explain and apply Ohm's law.
- Explain and apply Kirchhoff's Laws.
- Compute conductance and resistance of conductors.

Electrical - Unit 04 - Fundamentals of Electrical Circuits: Series, Parallel, and Combination Circuits

- Explain series circuits.
- Explain parallel circuits.
- Explain series parallel combination circuits.
- Draw a series circuit and calculate the circuit values.
- Draw a parallel circuit and calculate the circuit values.
- Draw a series and parallel combination circuit and calculate the circuit values.

Electrical - Unit 05 - Electrical Tools, Equipment, Materials, and Testing Techniques

- Identify and select the tools, equipment, and materials to complete various electrical projects.
- Identify the types of bends made in conduit, including 90-degree bends, back-to-back bends, offsets, kicks, and saddle bends.
- Demonstrate the use of a hand bender to make 90-degree bends, back-to-back bends, offsets, kicks, and saddle bends in conduit.
- Demonstrate the correct application of fasteners and anchors.

- Demonstrate the proper use of a multimeter, clamp-on ammeter, and megohmmeter.
- Demonstrate testing of ground fault circuit interrupters (GFCIs).
- Demonstrate testing of Arc-Fault Circuit Interrupters (AFCIs).
- Demonstrate the proper handling and storing of capacitors, motors, transformers, and other electrical equipment.

Electrical - Unit 06 - Electrical System Sizing and Calculations

- Demonstrate the proper sizing of electrical device boxes.
- Demonstrate the proper sizing of electrical pull boxes.
- Demonstrate the proper sizing of electrical conduits.
- Accurately compute loads for various circuits.
- Identify and calculate voltage/current for primary and secondary windings.
- Determine KVA capacity of a single-phase and three-phase transformer.
- Differentiate between Delta and Wye connections.

Electrical - Unit 07 - Conductor Selection and Installation

- Identify and explain wire sizes, how they are measured, and how many strands there should be for a given size.
- Define and determine conductor ampacities and factors to consider when selecting wire material, such as conductivity, cost, availability, and workability.
- Identify the various types of conductor insulation.
- Accurately select proper conductors for a specified application.
- Demonstrate the proper installation of selected conductors in residential applications.

Electrical - Unit 08 - Electrical Components and Installations

- Identify the major types of fixed resistors.
- Identify the resistance of a resistor using the color code.
- Determine if a resistor is operating within its power rating.
- Connect a variable resistor for use as a potentiometer.
- Drill holes in metal, wood, and concrete for electrical installations.
- Determine the layout of electrical devices, complying with local, state, and national electric code regulations.
- Install the conductors into conduit, complying with the appropriate local, state, and national electric codes.
- Install switch boxes, complying with the appropriate local, state, or national electric codes.

- Install electrical cord connections on equipment, complying with the appropriate local, state, or national electric codes.
- Install cable, complying with the appropriate local, state, or national electric codes.
- Install standard outlet boxes, complying with the appropriate local, state, or national electric codes.

Electrical - Unit 09 - Switches, Receptacles, and Dimmers: Residential Wiring Basics

- Identify the three main types of switches used for residential applications (single-pole, three-way, and four-way) and describe how they are wired.
- Identify the types of receptacles used in residential wiring applications.
- Identify the types of dimmers used in residential wiring applications.
- Install standard switches on single-pole switched lighting circuits.
- Install standard duplex receptacles on always-on and single-pole switched lighting circuits.
- Install GFCI duplex receptacles.
- Install dimmers on single-pole switched lighting circuits.

Electrical - Unit 10 - Three-Way and Four-Way Switching Circuits: Installation and Maintenance

- Install switches on three-way switched lighting circuits.
- Install receptacles on three-way switched lighting circuits.
- Install dimmers on three-way switched lighting circuits.
- Install switches on four-way combination circuits.
- Install receptacles on four-way combination circuits.
- Install dimmers on four-way combination circuits.
- Clean the work area and maintain it in a safe condition.

Electrical - Unit Sim

- Install residential switches and outlets

HVAC 1 (Video & VR)

HVAC 1 - Unit 01 - HVAC Fundamentals: Principles, Systems, and Safety

- Describe the fundamental concepts of heating, ventilation, air conditioning, and refrigeration.
- Identify the common types of HVAC-R systems.

- Describe personal and worksite safety principles to maintain safe and healthy work environments.
- Identify the various personal protective clothing and equipment used in HVAC and explain their functions.
- Describe how to use personal protective clothing and equipment used in HVAC.
- Describe how to care for personal protective clothing and equipment used in HVAC.
- Identify and explain the common safety procedures when working with heating, air conditioning, and refrigeration systems and equipment.
- Identify and explain general safety issues and EPA rules and regulations regarding the handling of refrigerants.
- Describe the purpose of local, state, and federal heating, air-conditioning, and refrigeration codes and standards.
- Identify and explain safe-handling practices as they relate to hazardous and volatile fluids, compounds, and gases.
- Identify the basic and specialized tools of the HVAC trade and explain how they are used.
- Explain the safety precautions to follow when using hand and power tools.
- Describe appropriate care and maintenance procedures for tools and tool accessories.
- Explain how to properly use pipe wrenches, torque wrenches, hammers and mallets, tin snips, hand and power hacksaws, drills, and measuring instruments.

HVAC 1 - Unit 02 - HVAC Safety, Regulations, and Mathematics

- Explain how to follow the manufacturer's installation instructions and why they are important.
- Explain emergency procedures to follow in response to workplace accidents.
- Explain the need for employee background checks.
- Explain the need for medical examinations.
- Explain the reasons for regular safety meetings and company safety policies.
- Explain the reasons for disaster and/or emergency response plans, identify what they contain, and describe how they are used.
- Demonstrate knowledge of arithmetic operations.
- Demonstrate knowledge and application of measuring.
- Demonstrate knowledge and application of area and volume calculations.
- Apply basic math computations to construction settings.
- Apply basic geometric calculations including the 3-4-5 rule.

- Explain the mathematical relationship between volume, weight, pressure, vacuum, and temperature related to the HVAC-R trade.
- Demonstrate knowledge of the math needed to calculate amperage, voltage, wattage, and resistance.
- Explain how to measure and calculate absolute and gauge pressures.

HVAC 1 - Unit 03 - Electrical Fundamentals for HVAC Professionals

- Define and explain the relationship between current, voltage, resistance, and power.
- Explain the difference between DC and AC electricity.
- Describe the safety practices to prevent electric shock when working with HVACR equipment.
- Define and explain watts, ohms, volts, and amps.
- Describe electric motors and heaters as load devices.
- Describe control devices that control electricity and protect against electrical surges.
- Describe control devices that use magnetism.
- Describe electronic controls.
- Explain what conduit is and how it is used in HVAC.

HVAC 1 - Unit 04 - Electrical Fundamentals for HVAC Systems

- Identify the different types of resistors and explain how their resistance values can be determined.
- Describe the different types of electrical circuit diagrams and explain how to read them.
- Explain Ohm's Law and Kirchhoff's Law in relation to different types of electrical circuits.
- Identify and explain how electrical measuring tools and devices work.
- Identify and explain appropriate electrical wiring symbols.
- Explain single- and three-phase power distribution.
- Describe the operation of various types of transformers.

HVAC 1 - Unit 05 - Fundamentals of Heat Transfer and Furnace Operation

- Describe matter, heat, and heat transfer.
- Explain the three methods of heat transfer.
- Identify the major components of a forced air furnace (gas and electric) and explain their function.
- Explain the sequence of operation for a gas furnace.

- Describe the function of furnace air filters and explain the importance of frequent cleaning or replacement.
- Explain the factors that must be considered when preparing to install a furnace.
- Explain how to install and adjust a gas valve.
- Describe the difference between heat and temperature.

HVAC 1 - Unit 06 - Heat Pumps and Refrigeration Systems

- Explain the electrical and mechanical operations of a basic heat pump.
- Identify and explain the following heat-pump systems: air-to-air, air-to-water, water-to-water, ground-to-air (geothermal), open-loop, and closed-loop.
- Explain how to determine the temperature differential for an outdoor heat exchanger coil.
- Explain how to determine the temperature differential for an indoor heat exchanger coil.
- Identify the major components of a cooling system and explain how they operate.
- Explain the basic refrigeration cycle.
- Define and explain fluid pressure and temperature.
- Describe and explain freezing point, critical temperature, and absolute zero.

HVAC 1 - Unit 07 - Refrigerants and Cooling System Components

- Identify the refrigerants commonly used in cooling systems and the types of applications in which each is used.
- Identify and explain the classifications, properties, and uses of different refrigerants based on chemical composition.
- Explain the proper methods of transferring, storing, and recovering refrigerants.
- Explain how to evaluate the condition of cooling systems using temperature and pressure measuring instruments.
- Explain the effects of improper refrigerants and contaminants in a cooling system.
- Identify various types of compressors and how they function.
- Identify various types of evaporators and how they function.
- Identify various types of condensers and how they function.

HVAC 1 - Unit 08 - Gas Properties, Air Distribution, and Measurement Techniques

- Explain the physical properties of contained gases and air distribution systems and how they are related within a closed system.
- Describe the components of an air duct system and explain how they work together to distribute air through a given environment.

- Identify the instruments used to make measurements in air systems and explain what each instrument is used for: temperature and humidity meters, pressure measurement instruments, air velocity measurement instruments, and instruments for measuring rotational speed.
- Explain the process of how an HVAC technician uses the appropriate instruments to take measurements for basic temperature and humidity in an air distribution system.
- Explain the process of how an HVAC technician uses the appropriate instruments to take measurements for air pressure in an air distribution system.
- Explain the process of how an HVAC technician uses the appropriate instruments to take measurements for air velocity in an air distribution system.
- Explain the process of how an HVAC technician uses a tachometer to measure the rotational speed of a rotating device, such as a fan, blower, or motor.
- Describe airflow and pressures in a basic forced-air distribution system.
- Identify and describe the various types of layouts used in air duct system design, and explain when and where each type is used.

HVAC 1 - Unit 09 - Air Distribution Systems and Components

- Identify the various fittings and transitions used in air distribution systems and describe their effect on duct system design.
- Describe how to install the insulation and vapor barriers used in duct systems.
- Explain the differences between propeller and centrifugal fans and blowers.
- Explain the installation of metal, fiberboard, and flexible duct.
- Explain the use and installation of dampers used in duct systems.
- Identify and explain the operations of electrical control systems and their components.
- Identify and explain the purpose of the piping, tubing, and fittings used in the heating, air-conditioning, and refrigeration industry.
- Explain how to correctly prepare and install polyvinyl chloride (PVC) piping.
- Describe procedures and precautions that must be taken when preparing and installing HVACR piping.

HVAC 1 - Unit 10 - Tubing Fabrication and Joining Techniques

- Explain how to bend tubing with tube benders.
- Describe how to connect tubing using flared fittings, pressed fittings, and compression fittings.
- Describe how to connect tubing using a swaged-joint connection.

- Explain how to braze and solder copper tubing and fittings in a safe and professional manner.
- Identify and explain the use of various types of torches used for soldering, brazing, and cutting refrigerant lines.
- Explain how to select and use appropriate brazing alloys and materials.
- Explain the purposes and procedures for protecting piping materials and fabrication from the heat.
- Describe how to silver-braze brass, steel, and copper.

HVAC 1 - Unit Sim

- Identify parts of an AC
- Identify parts of a gas furnace
- Identify part of a gas boiler

HVAC 2 - (Video & VR)

HVAC 2 - Unit 01 - Safety and Tools in HVAC: Essential Practices for Technicians

- Identify the basic first aid skills and procedures as they relate to HVAC service and installation.
- Identify the causes of jobsite accidents and hazards and describe measures to prevent them from occurring.
- Demonstrate knowledge of personal protective equipment (PPE) necessary to complete HVAC projects, including identification and usage.
- Identify the OSHA regulations for safety as they relate to HVAC service and installation.
- Explain the protocol for handling and reporting accidents in the HVAC trade.
- Describe the procedures for using fire protection equipment.
- Explain the four classes of fire extinguishers and how each are used.
- Demonstrate knowledge of electrical safety procedures in HVAC service and installation.
- Identify and safely use basic hand tools used in HVAC service and installation.
- Identify and safely use basic power tools used in HVAC service and installation.

HVAC 2 - Unit 02 - Lifting, Ladders, Heat Transfer, and Blueprint Reading

- Explain safe lifting techniques.
- Describe the proper techniques used in ladder safety.
- Demonstrate an understanding of the modes of heat transfer and BTU (British Thermal Unit).

- Explain how to use temperature conversion scales.
- Define the compression ratio and describe how it is used.
- Explain how to measure in increments and correctly identify fractions.
- Identify the different types of blueprint plans.
- Interpret blueprints and electrical diagrams.

HVAC 2 - Unit 03 - Electrical Fundamentals and Applications in HVAC Systems

- Describe how an alternating current is developed and draw a sine wave.
- Explain series and parallel circuits.
- Describe the process of wiring a residential heat pump control circuit.
- Describe how to perform troubleshooting, service, and repair techniques on various electrical circuits and components.
- Explain the operation of a single-phase transformer.
- Describe the process of testing transformers.
- Identify and describe applications of single-phase motors.
- Describe how to perform troubleshooting, service, and repair techniques on various motors and motor controls in an HVAC system.

HVAC 2 - Unit 04 - Electrical Components and Troubleshooting in HVAC Systems

- Describe the types and applications of capacitors.
- Describe how compressors operate in an HVAC system.
- Demonstrate the common procedures for service and maintenance of both hermetic and semi-hermetic compressors.
- Demonstrate how to identify the start, run, and common terminals on a compressor.
- Explain how magnetism works in various electrical components in an HVAC system.
- Describe how relays and contactors work.
- Describe the process of testing relays and contactors for continuity and resistance.
- Describe the process of testing relays and contactors for input and output voltages.
- Describe what solenoids are, how they work, and the process of testing them.
- Identify and explain the types and operation of thermostats.
- Explain the correct thermostat installation procedures.
- Describe the process of testing bi-metal thermostats.
- Identify and explain the low-voltage side of an HVAC system.
- Describe how to perform troubleshooting, service, and repair techniques on the low-voltage side of an HVAC system.
- Explain how to determine fuse size and describe how to test fuses in an HVAC system.

HVAC 2 - Unit 05 - Gas and Oil Heating Systems: Components, Maintenance, and Troubleshooting

- Identify the components of various heating systems.
- Identify the temperature and pressure measurements of a heating system.
- Describe the principles of combustion.
- Explain the process of performing maintenance on a gas furnace.
- Describe how to perform troubleshooting, service, and repair techniques on conventional and condensing gas heating equipment.
- Identify equipment related to oil heating.
- Describe how to install and adjust oil-fired equipment.
- Explain how to perform annual preventative maintenance on oil-fired equipment.
- Describe how to perform troubleshooting techniques on oil-fired equipment.
- Describe how to perform service and repair techniques on oil-fired equipment.

HVAC 2 - Unit 06 - Electrical Heating and Heat Pumps: Installation, Maintenance, and Troubleshooting

- Identify equipment that is related to electric heating units.
- Discuss the efficiency of electric heat.
- Describe how to perform troubleshooting, service, and repair techniques on an electric heating system.
- Explain the modes of operation for a heat pump.
- Identify and describe heat pump components.
- Demonstrate how to install heat pumps.
- Describe how to perform troubleshooting, service, and repair techniques on a heat pump system.

HVAC 2 - Unit 07 - Refrigeration System Maintenance and Troubleshooting

- Identify refrigerants by pressure and temperature relationship and select appropriate refrigerants and oils.
- Explain how to recover, pressure test, evacuate, and charge an air conditioning system.
- Test refrigerant components using proper procedures.
- Describe various refrigeration system types and operations.

HVAC 2 - Unit 08 - Refrigeration Defrost Systems: Troubleshooting, Maintenance, and Environmental Compliance

- Explain how the defrost cycle works for the evaporator coil in air conditioning, refrigeration, and heat pump systems.
- Describe how to perform troubleshooting, service, and repair techniques on defrost system controls and components.
- Define and describe the process of recovery, recycling, and reclamation as it applies to refrigerants.
- Identify and describe the proper handling techniques and disposal process of refrigerants.
- Explain the EPA legislation and regulation as it pertains to refrigerant recovery.

HVAC 2 - Unit 09 - HVAC Ductwork Design, Fabrication, and Installation

- Identify and describe the different types of duct system components.
- Describe how to measure temperature, humidity, and air velocities.
- Explain how to perform basic duct fabrication functions.
- Describe velocity, static, and total air pressures in a system.
- Demonstrate the ability to assemble premade sections of ductwork.
- Explain how to make and install S-cleats, drive cleats, and Pittsburgh seams.
- Explain how to install flex ducts, take-offs, boots, and registers.
- Describe what is meant by indoor air quality.
- Define the function and explain the application of air filters.
- Identify the types of filters in air distribution systems.

HVAC 2 - Unit 10 - HVAC System Maintenance and Troubleshooting: Air Quality, Refrigeration, and Load Calculations

- Explain the principles and methods for air cleaning and purification.
- Identify the benefits of proper humidification.
- Explain the different types of humidifiers.
- Determine the health factors in dehumidification and humidification.
- Explain how to properly operate manifold gauges.
- Describe how to properly operate recovery machines, vacuum pumps, micron gauges, charging scales, and leak detectors.
- Demonstrate the ability to check the superheat and subcooling measurements.
- Explain how to perform heat loss calculation of a structure.
- Explain how to perform heat gain calculation of a structure.

HVAC 2 - Unit Sim

- Identify parts of a gas furnace
- Identify parts of an AC
- Identify part of a gas boiler

Plumbing (Video & VR)

Plumbing - Unit 01 - Plumbing Career Paths: A Comprehensive Guide

- Identify information on current and future job opportunities in the plumbing trade industry and discuss its trends.
- Describe career ladders for the entry, intermediate, and technical level careers in each of the plumbing trade industry programs and preparation requirements.
- Describe advanced training opportunities, including apprenticeship programs in each of the plumbing trade industry programs.
- Discuss the history of plumbing trades.
- Define the terms used in the plumbing trade industry.
- Identify pipes, fittings, materials, and equipment related to the plumbing trades.

Plumbing - Unit 02 - Plumbing Tools, Equipment, and Safety

- Identify and use the basic tools, equipment, and materials of the plumbing trade industry.
- Demonstrate the procedures and techniques for the selection, use, care, and storage of tools and equipment.
- Compare the various tools used for plumbing and pipe fitting.
- Identify tools and equipment and the safety hazards associated with them.
- Read and interpret measuring devices used in the plumbing industry.
- Explain the importance of following safety precautions when working in the plumbing trade industry.
- Describe the personal and jobsite safety rules and regulations that must be followed to maintain safe and healthy work environments.
- Identify safe working practices and conditions used in the plumbing trade industry.
- Explain emergency procedures to follow in response to workplace accidents.

Plumbing - Unit 03 - Plumbing Mathematics and Blueprint Interpretation

- Solve plumbing problems for perimeter and circumference measurements for squares, rectangles, and circles.

- Solve plumbing problems for area measurements for rectangles and squares, and the surface area of cylinders.
- Explain pressure measurement in terms of Pounds per Square Inch (PSI), inches of mercury, and Kilopascals (KPA).
- Solve plumbing problems for volume, weight, and circumference measurements for cylinders.
- Measure tolerances on horizontal and vertical surfaces using feet and inches, fractions of inches.
- Calculate piping offsets.
- Solve plumbing-related basic math problems, such as slope and flow rate.
- Solve plumbing-related basic math problems, such as head pressure, PSI, and pressure loss.
- Identify the basic symbols used for plumbing systems in construction drawings.
- Interpret roof drains, leaders, and drainage systems in construction drawings.

Plumbing - Unit 04 - Material Takeoffs and Cost Estimation

- Interpret material take-off lists and bills of materials.
- Determine the costs for plumbing materials based on a take-off list.
- Prepare cost estimates for materials and labor based on a take-off list.

Plumbing - Unit 05 - Plumbing Fundamentals: Components, Functions, and Installation

- Explain the basic theory and principles of plumbing, including the identification of common pipes and fittings.
- Explain the function of a trap, identify the types of traps used in residential plumbing systems, and describe the factors that go into deciding the proper placement for a trap.
- Identify pipe joining methods.
- Identify and describe the functionalities of a toilet.
- Identify and describe the functionalities of faucets and drains, as found in bathroom and kitchen sinks, bathtubs, and showers.
- Identify the components and types of fire sprinkler systems and explain how they work.
- Identify and describe the functionalities of gas fixtures and appliances.

Plumbing - Unit 06 - Plumbing Components and Installation

- Identify the different types of valves by type, size, material, and application.
- Describe the effect of temperature and pressure changes, chemical reactions, and moisture content on various plumbing systems.

- Demonstrate an understanding and proper installation of pipes and fittings.
- Demonstrate an understanding and proper installation of valves.
- Demonstrate an understanding and proper installation of hangers and supports.
- Demonstrate an understanding and proper installation of appliances.
- Demonstrate an understanding and proper installation of fixtures.

Plumbing - Unit 07 - Installation of Pipes and Fittings for Drain, Waste, Vent (DWV) and Potable Water Systems

- Demonstrate the proper installation of plastic pipes and fittings used in Drain, Waste, and Vent (DWV) systems.
- Demonstrate the proper installation of steel and iron pipes and fittings used in Drain, Waste, and Vent (DWV) systems.
- Demonstrate the installation of piping and fittings used in potable water systems.
- Demonstrate the proper installation of copper pipes and fittings used in Drain, Waste, and Vent (DWV) systems.

Plumbing - Unit 08 - Plumbing Fixture Installation

- Demonstrate the installation of water meters.
- Demonstrate the installation of water heating appliances.
- Demonstrate the installation of kitchen fixtures, including sinks and dishwashers.
- Demonstrate the installation of bathroom fixtures, including drains, vents, sinks, bathtubs, and faucets.
- Demonstrate the installation of a toilet.
- Demonstrate the installation of washers and dryers.
- Demonstrate the installation of utility fixtures.

Plumbing - Unit 09 - Plumbing Inspections, Troubleshooting, and Repair Techniques

- Explain the purpose of and differentiate between the stages of plumbing inspections, including the underground, top-out or rough-in, and final trim stages.
- Demonstrate how to troubleshoot and diagnose issues in plumbing systems.
- Demonstrate how to repair washerless faucets.
- Demonstrate how to repair traditional compression faucets.
- Demonstrate how to replace fill valves in toilets.
- Demonstrate how to replace flush valves in toilets.

Plumbing - Unit 10 - Drain and Fixture Repair: A Practical Guide

- Demonstrate how to unclog drains and traps.

- Demonstrate how to repair leaks in traps and faucets.
- Demonstrate how to repair and replace sink strainers.
- Demonstrate how to repair fixture water supply pipes.
- Examine how to follow ethical practices in service and repair.

Plumbing - Unit Sim

- Solder copper pipes and fittings
- Layout the plumbing for a typical bathroom

Welding (Video & VR)

Welding - Unit 01 - Welding Safety and Hazard Mitigation

- Identify various welding hazards and safe practices.
- Display familiarity with industrial and OSHA safety standards.
- Demonstrate knowledge of oxyfuel safety procedures.
- Demonstrate knowledge of arc welding and cutting safety procedures.
- Demonstrate knowledge of material handling techniques to safely move materials.

Welding - Unit 02 - Welding Safety and Industry Practices

- Explain the processes of separating, forming, conditioning, fabricating, and finishing of materials.
- Demonstrate proper and safe use of PPE.
- Demonstrate proper and safe use of hand tools and power equipment.
- Demonstrate knowledge of clean-up procedures.
- Demonstrate knowledge of the use of current manufacturing processes as related to the welding industry.
- Demonstrate an understanding of the importance and impact of routine maintenance of machines and equipment.

Welding - Unit 03 - Metallurgy and Welding Processes: Understanding Metals and Their Preparation

- Identify the physical characteristics of metals.
- Describe and understand the differences between ferrous and nonferrous metals.
- Describe the differences between casting and forging and explain how alloys are used in these processes.
- Explain the processes of preheating, post heating, and heat treatment.

Welding - Unit 04 - Welding Metallurgy and Design

- Apply appropriate mathematical practices to the design and creation of drawings using welding symbols.
- Read and interpret blueprints and sketches.
- Describe distortion control methods.
- Identify basic mechanical properties of metals.
- Identify and describe common shapes, dimensions, and gauges of metals.
- Interpret weld and welding symbols.

Welding - Unit 05 - Joint Design, Welding Preparation, and Quality Assurance

- Identify various joint designs (joint geometry) and welding positions.
- Clean and prepare materials for groove and fillet welds.
- Identify welding defects and any discontinuities.
- Test welds using various destructive techniques.
- Test welds using various nondestructive techniques.

Welding - Unit 06 - Oxyfuel Cutting: Principles, Equipment, and Applications

- Use standard measuring and layout tools.
- Identify oxyfuel cutting principles.
- Identify and maintain oxyfuel equipment.
- Handle and store compressed gas cylinders.
- Cut and form metal with oxyfuel equipment.
- Perform straight cutting operations using the manual oxyfuel cutting process on plain carbon steel.

Welding - Unit 07 - Arc Cutting Processes: Principles, Equipment, and Consumables

- Identify arc cutting process principles.
- Assemble and disassemble arc cutting equipment.
- Identify and maintain arc cutting equipment.
- Exhibit an understanding of arc cutting consumables.

Welding - Unit 08 - Arc Cutting and Stick Welding Techniques

- Demonstrate appropriate use of arc cutting equipment.
- Explain the principles of SMAW.
- Set up and maintain SMAW equipment.
- Demonstrate selection and application of SMAW consumables.

Welding - Unit 09 - Shielded Metal Arc Welding and Gas-Based Welding: Techniques and Applications

- Using Shielded Metal Arc Welding, perform fillet and groove welds on a plate in all positions.
- Make pad welds, in all positions, on plain carbon steel.
- Explain the principles of GMAW and FCAW.
- Set up and maintain GMAW and FCAW equipment.
- Demonstrate identification of GMAW and FCAW consumables.

Welding - Unit 10 - Gas Metal Arc Welding and Gas Tungsten Arc Welding: Principles and Applications

- Using Gas Metal Arc Welding, perform fillet and groove welds on a plate in all positions.
- Explain the principles of GTAW.
- Set up and maintain GTAW equipment.
- Demonstrate selection and application of GTAW consumables.
- Perform fillet and groove welds on ferrous and nonferrous metals in all positions.

Welding - Unit Sim

- Understand Oxy Acetylene Welding (Oxyfuel Cutting)
- Understand Shielded Metal Arc Welding
- Understand Gas Metal Arc Welding
- Understand Uphill Flux Cored Arc Welding
- Understand Stainless Steel Gas Tungsten Arc Welding
- Understand Aluminum Gas Tungsten Arc Welding

Core-LX

Carpentry

Micro-Credential: Residential Home Building

- nan

Floor Framing

- nan

Roof Framing

- nan

Plumbing 1

Copper Tube and Fittings

- a. Identify the various types of copper tube.
- b. Identify the material properties, storage, and handling requirements of copper tube.
- c. Identify the types of fittings and valves used with copper tube.
- d. Identify the techniques used in hanging and supporting copper tube.
- e. Properly measure, cut, and join copper tube.
- f. Identify the hazards and safety precautions associated with copper tube.

Introduction to Drain, Waste, and Vent (DWV) Systems

- a. Explain how waste moves from a fixture through the drain system to the environment.
- b. Identify the major components of a drainage system and describe their functions.
- c. Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
- d. Identify significant code and health issues, violations, and consequences related to DWV systems.
- e. Sketch an isometric drawing of a simple DWV system and label its components

Introduction to Plumbing Drawings

- a. Identify various plumbing drawings and describe how the different views are used.
- b. Identify the basic symbols used in schematic drawings of pipe assemblies.
- c. Explain the types of drawings in a complete set of drawings and how they relate to each other.
- d. Interpret plumbing-related information from a set of drawings.
- e. Sketch an orthographic and isometric drawing.
- f. Use an architect's scale to draw lines to scale and to measure lines drawn to scale
- g. Discuss how code requirements apply to certain drawings.

Introduction to Plumbing Math

- Completion

Introduction to the Plumbing Industry

- a. Describe the history of the plumbing profession.
- b. Identify the responsibilities of a person working in the plumbing industry.
- c. State the personal characteristics of a professional.

- d. Identify the stages of progress within the plumbing profession and its positive impact on society.
- e. Identify how green technology is incorporated into plumbing.

P2 06 Installing and Testing Water Supply Piping

- Determine the location of fixtures.
- Identify the size of the pipe to be installed.
- Determine the route of the water supply piping.
- Determine the location the water heater, water softener, and hose bibbs.

Plastic Pipe and Fittings

- a. Identify the various types of plastic pipe.
- b. Identify the material properties, storage, and handling requirements of plastic pipe.
- c. Identify the types of fittings and valves used with plastic pipe.
- d. Identify the techniques used in hanging and supporting plastic pipe.
- e. Properly measure, cut, and join plastic pipe.
- f. Identify the hazards and safety precautions associated with plastic pipe.

Plumbing Safety

- a. Describe the common unsafe acts and unsafe conditions that cause accidents.
- b. Describe how to handle unsafe acts and unsafe conditions.
- c. Explain how the cost of accidents and illnesses affects everyone on site.
- d. Demonstrate the use and care of appropriate personal protective equipment.
- e. Identify job-site hazardous work specific to plumbers.
- f. Explain how to work safely in and around a trench.
- g. Explain how to work safely in and around confined spaces.
- h. Demonstrate the proper use of ladders.
- i. Demonstrate how to maintain power tools safely.
- j. Describe and demonstrate the lockout/tagout process.
- k. Identify the benefits of a job safety analysis.

Plumbing Tools of the Trade

- c. Demonstrate the ability to select the proper tool(s) for tasks.
- d. Demonstrate proper maintenance and storage for hand and power tools.
- e. Describe the safety requirements for using power and hand tools common to the plumbing trade.

- a. Identify the basic hand and power tools used in the plumbing trade.
- b. Demonstrate the proper use of plumbing tools.

Tools of the Trade Checklist

- Measuring and Layout Tools .
- Leveling Tools
- Tooth-Edged Cutting Tool
- Smooth-Edged Cutting Tools
- Manual Pipe Cutters
- Drilling and Boring Tools
- Pipe-Threading Machine
- Wrenches & Pliers
- Hammers
- Screw Drivers
- Vices
- Calculator
- Chain Wrenches and Tongs

Residential Carpentry

01 Job Site Safety

- a. Describe the characteristics of jobsite safety.
- b. Identify personal safety devices used in construction.
- c. Describe the function of various tools and equipment commonly found on a jobsite.
- d. Describe the safe use of ladders, ladder jacks, and sawhorses.
- e. Identify safety concerns with jobsite electricity.
- f. Identify and describe the safety concerns when using scaffolds.
- g. Erect and dismantle metal scaffolding in accordance with recommended, safe procedures.
- h. Follow a recommended procedure to inspect a scaffold for safety.
- i. Describe the recommended capacities of various parts of a scaffold.
- j. Construct a scaffold work platform.
- k. Identify and describe the components of a fall protection system.
- l. Describe the safety concerns when using mobile metal tubular scaffolds.
- m. Build safe staging areas using roof brackets.
- n. Safely set up, use, and dismantle pump jack scaffolding.

- o. Build a ladder and sawhorse.

02 Job Site Safety 2 of 2

- m. Build safe staging areas using roof brackets.
- n. Safely set up, use, and dismantle pump jack scaffolding.
- k. Identify and describe the components of a fall protection system.
- l. Describe the safety concerns when using mobile metal tubular scaffolds.
- i. Describe the recommended capacities of various parts of a scaffold.
- j. Construct a scaffold work platform.
- g. Erect and dismantle metal scaffolding in accordance with recommended, safe procedures.
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- f. Identify and describe the safety concerns when using scaffolds.
- c. Describe the function of various tools and equipment commonly found on a jobsite.
- d. Describe the safe use of ladders, ladder jacks, and sawhorses.
- a. Describe the characteristics of jobsite safety.
- b. Identify personal safety devices used in construction.
- o. Build a ladder and sawhorse.

03 Hand Tools

- Identify and describe the hand tools the carpenter commonly uses.
- b. Maintain hand tools in suitable working condition.
- c. Use hand tools in a safe and appropriate manner

04 Hand Power Tools

- a. State general safety rules for operating power tools.
- b. Describe and safely use the following: circular saws, saber saws, reciprocating saws, drills, hammer-drills, screwdrivers, planes, routers, sanders, staplers, nailers, and power-actuated drivers.

05 Stationary Power Tools

- c. Safely operate a table saw, miter saw, band saw, jointer, drill press, shaper, and bench sander.
- a. State general safety rules for operating power tools.
- b. Describe and adjust a table saw, miter saw, band saw, jointer, drill press, shaper, and bench sander

06 Wood and Wood Products

- e. Describe the uses and sizes of: laminated veneer lumber, parallel strand lumber, laminated strand lumber, wood I-beams, and glue-laminated beams.
- c. Calculate linear foot and compute square foot and board foot measure.
- d. Describe the composition, kinds, sizes and several uses of: plywood, oriented strand board, particleboard, hardboard, medium-density fiberboard, and softboard.
- a. Define hardwood and softwood and give examples of some common kinds of species.
- b. State the grades and sizes of lumber.

07 Fasteners

- Name and describe the following commonly used fasteners and select them for appropriate use: Nails; screws; lag screws; bolts; solid wall anchors; hollow wall anchors; adhesives.

08 Building Plans and Codes

- Identify various types of lines and read dimensions.
- Demonstrate how specifications are used.
- Identify and explain the meaning of symbols and abbreviations used on a set of prints.
- Read and interpret plot, foundation, floor, and framing plans.

09 Building Layout

- d. Lay out building lines by using the Pythagorean theorem, and check the layout for accuracy.
- b. Accurately set up and use the builder's level, transit-level, and laser level.
- c. Use an optical level to determine elevations.
- e. Build better boards and accurately establish building lines with string.
- a. Establish level points across a building area using a water level and a carpenter's hand spirit level in combination with a straightedge.

10 Concrete Form Construction

- a. Construct forms for footings, slabs, walks, and driveways.
- b. Construct concrete forms for foundation walls.
- c. Lay out and build concrete forms for stairs.
- d. Explain techniques used for the proper placement and curing of concrete.
- e. Describe the composition of concrete and factors affecting its strength, durability and workability.

- f. Explain the reasons for making a slump test.
- h. Estimate quantities of concrete.
- g. Explain the reasons for reinforcing concrete and describe the materials used.

11 Floor Framing

- a. Describe platform, balloon, and post-and-beam framing, and identify framing members of each.
- b. Describe several energy and material conservation framing methods.
- c. Build and install girders, erect columns, and lay out sills
- d. Lay out and install floor joints.
- e. Frame openings in floors.
- f. Lie out, cut, and install bridging.
- g. Apply subflooring.
- h. Describe methods to prevent destruction by wood pests

12 Wall Framing

- a. Identify and describe the function of each part of the wall frame.
- b. Determine the rough opening width and height for windows and doors.
- c. Lay out the wall plates for partition, intersections, openings, and OC studs.
- d. Describe several methods of framing corner and partition intersections.
- e. Assemble and construct a wall section.
- f. Erect and temporarily brace a wall section plumb and straight.
- g. Describe the function of and install blocking and backing.
- h. Apply wall sheathing.
- i. Identify and describe the components of nonstructural steel wall framing.
- j. Install a steel door buck.

13 Roof Framing

- a. Describe several roof types.
- b. Define the various roof framing terms.
- c. Identify the members of gable, gambrel, hip, intersecting, and shed roofs.
- i. Apply roof sheathing.
- d. Lay out a common rafter and erect a gable roof.
- e. Lay out and install gable end studs.
- f. Lay out a hip rafter and hip jack rafters.
- g. Lay out a valley rafter and valley rafters.

- h. Describe and perform the safe and proper procedure to erect a trussed roof.
- j. Estimate the quantities of materials used in a roof frame.

14 Roofing

- c. Describe and apply flashing to valleys, sidewalls, chimneys, and other roof obstructions.
- a. Define roofing terms.
- b. Describe and apply roofing felt underlayment, organic or fiberglass asphalt shingles, and roll roofing.
- d. Estimate needed roofing materials.

15 Windows

- Parts and Types
- Tools and Materials
- Installation
- Install Review for the Construction Manager

16 Siding and Decks

- e. Apply wood shingles and shakes to sidewalls.
- f. Apply vinyl and aluminum siding.
- g. Describe various types of cornices and name their parts.
- h. Install gutters and downspouts.
- a. Describe the shapes, sizes, and materials used as siding products.
- b. Install corner boards and prepare sidewall for siding.
- c. Apply horizontal and vertical siding.
- d. Apply plywood and tapered siding.

17 Doors

- g. Install locksets in doors.
- h. Install bypass, bi-fold, and pocket doors.
- c. Install various types of windows in an approved manner.
- d. Name the parts of and set a pre-hung door frame.
- e. Describe the standard designs and sizes of doors and name their parts.
- f. Fit and hang a door to a preexisting opening.
- a. Describe the most popular styles of windows and name their parts.

- b. Select and specify desired sized and styles of windows from manufacturers' catalogs

HVACR.EDU

HVACR Ready to Work (RTW) Program

01 Employability Skills: 010-2 Personal Work Habits Module

- Understand Time Management & Priorities
- Understand Personal Cleanliness
- Understand Dress for Work
- Understand Meal Planning
- Understand Money Management
- Understand Leave Personal Issues at Home
- Understand Travel to Work
- Understand Dependability

010 Employability Skills

- Understand residential HVAC
- Understand commercial HVAC
- Understand a quote/proposal and acceptance of proposal
- Understand the bill of materials
- Understand start up check sheets
- Understand warranty cards
- Understand warranty certificates
- Understand installation instructions
- Understand the homeowner's information
- Understand maintenance/service instructions
- Understand Time Management & Priorities
- Understand Personal Cleanliness
- Understand Dress for Work
- Understand Meal Planning
- Understand Money Management
- Understand Leave Personal Issues at Home
- Understand Travel to Work
- Understand Dependability

- Understand an overview of industry paperwork and record-keeping
- Understand how to make a good first impression.
- Understand the unit parts list
- Understand troubleshooting guides
- Understand bid proposals
- Understand design build
- Understand commercial commissioning
- Understand record-keeping
- Understand what makes up non-verbal communications
- Understand several aspects of verbal communications
- Understand skills to improve their listening
- Understand what courtesy is
- Understand the definition of relationships
- Understand the roles and expectations of work relationships
- Understand how to conclude the service call on a positive note

02 Employability Skills: 306-6 Industry Paperwork & Recordkeeping Module

- Understand design build
- Understand commercial commissioning
- Understand record-keeping
- Understand an overview of industry paperwork and record-keeping
- Understand residential HVAC
- Understand commercial HVAC
- Understand a quote/proposal and acceptance of proposal
- Understand the bill of materials
- Understand start up check sheets
- Understand warranty cards
- Understand warranty certificates
- Understand installation instructions
- Understand the homeowner's information
- Understand maintenance/service instructions
- Understand the unit parts list
- Understand troubleshooting guides
- Understand bid proposals

03 Employability Skills: 010-3 Communications and Work Relationships

- Learn how to make a good first impression.
- Learn what makes up non-verbal communications
- Learn several aspects of verbal communications
- Learn skills to improve their listening
- Learn what courtesy is
- Learn the definition of relationships
- Learn the roles and expectations of work relationships
- Learn how to conclude the service call on a positive note

050 Applied Math

- Understand Subtraction of Decimal Fractions
- Understand Multiplication of Decimal Fractions
- Understand Division of Decimal Fractions
- Understand Addition of Whole Numbers
- Understand Subtraction of Whole Numbers
- Understand Multiplication of Whole Numbers
- Understand Division of Whole Numbers
- Understand Addition of Common Fractions
- Understand Subtraction of Common Fractions
- Understand Multiplication of Common Fractions
- Understand Division of Common Fractions
- Understand Addition of Decimal Fractions

106 Building Systems

- Learn about the types of residential structures that the HVAC Technician encounters every day in the field
- Provide direct guidance on the HVAC system design.
- Learn when to spot installation issues.
- Learn when to spot dangerous conditions.
- Learn about some construction terms used by workers across many trades.
Electricians, carpenters, HVAC techs, plumbers and more must be familiar with these terms. Walls, floors, and ceilings must be understood.
- Understand safety issues and concerns

109 Basic Hand and Power Tools

- Describe the major hazards from using worn or poorly maintained tools.
- List some important tips for proper usage of hand tools.
- Identify basic power tools used in HVACR installations.
- Understand the proper use of power tools in HVACR installations.
- Identify electronic tools necessary for HVACR installations.
- Understand the proper use of electronic tools used in the installation of HVACR equipment.
- Understand the proper use of tools related to working with sheet metal.
- Understand the proper use of tools related to working with piping as related to HVACR equipment.

Open Textbooks

Intro to AutoCAD 3D

Intro to AutoCAD 3D: 01 Part 1

- Describe AutoCAD's Ribbon and Toolbar menu systems and set one to used for this book.
- Describe a wireframe model and explain how it is viewed in 3D.
- Describe the UCS icon and explain how to configure and display it.
- Apply the VIEW, 3DORBIT, 3DFORBIT, 3DCORBIT, and UCSICON commands.
- Describe how the models drawn in lab exercises are checked for accuracy.
- Describe the World Coordinate System, the UCS icon, and the right-hand rule.
- Draw 3D models with the UCS located at the World Coordinate System.
- Describe the User Coordinate System and the User Construction Plane.
- Apply the UCSMAN command.
- Draw 3D models using the User Coordinate System located at the World or at the predefined orthographic UCS locations only.
- Describe and apply the UCS command to locate and orientate the UCS to any location necessary for model construction.
- Draw 3D models using the UCS command to locate and orientate the UCS.
- Within a one and one-half hour time limit, complete a written exam and a lab exercise without the aid of a key.

Intro to AutoCAD 3D: 02 Part 2

- Draw isometric drawings on an isometric grid using multiview drawings as a reference.

- Construct 3D models in AutoCAD using multiview drawings.
- Apply the TRIM and EXTEND commands when trimming and extending in three dimensional wireframe modeling.
- Apply the ROTATE3D command to rotate 3D models.
- Apply the 3DARRAY and MIRROR3D commands to construct and modify 3D models.
- Apply the VSCURRENT command to display 3D surface or solid models in the five predefined visual styles.
- Apply the more advanced options of the 3DORBIT command.
- Use the system variable VPCONTROL to enable the display the Viewport Controls menu and describe how this menu is used to set the current view and orientation of the model.
- Enable the display of the ViewCube and describe how it used to change the display and orientation of the model.
- Within a three hour time limit, complete a written exam and a lab exercise without the aid of a key.

Intro to AutoCAD 3D: 04 Part 4

- List the six solid primitives.
- Apply the BOX, WEDGE, CYLINDER, UNION, and SUBTRACT commands to draw solid models using solid models using solid primitives.
- Describe how solid models are created by extrusion or revolving.
- Apply the JOIN command to create a single 2D or 3D object from existing objects.
- Apply the EXTRUDE, PRESSPULL, and REVOLVE commands to draw solid models.
- Set the DELOBJ system variable to control objects used to create solid models.
- Describe how the UNION, SUBTRACT, and INTERSECT commands are used and applied when solid modeling.
- Apply the INTERSECT, FILLETEDGE, CHAMFEREDGE, and OFFSETEDGE commands to construct and modify solid models.
- Apply the SLICE command to cut solid models into two individual solids.
- Apply the SECTION command to create 2D cross sectional regions through solid models.
- Within a four hour time limit, complete a written exam and the lab exercises without the aid of a key.

Intro to AutoCAD 3D: 06 Part 6

- Describe how solid models are edited including the terms, body, face and edge.

- Apply the SOLIDEDIT command to edit faces of solid models.
- Apply the SOLIDEDIT and SOLIDCHECK commands to modify solid models.
- Apply the INTERFERE command to find interferences between two or more solids.
- Describe and apply the SOLIDEDIT command and the Shell option to create a hollow cavity, with a specified wall thickness, in a solid model.
- Apply the SOLVIEW, SOLDRAW, and SOLPROF commands to automatically create 2D working multiview drawings, including pictorial views, from solid models.
- Within a three hour time limit, complete a written exam and the lab exercises without the aid of a key.

Intro to AutoCAD 3D: 00 Intro + Configuring Software

- List the required software required to complete the AutoCAD 3D book.
- Describe the book's philosophy and explain how to use the book to learn how to apply the AutoCAD commands and features to draw 3D drawings.
- Configure your AutoCAD software for the AutoCAD 3D book.

Intro to AutoCAD 3D: 03 Part 3

- Describe surface faces and meshes and explain when and why they are used.
- Apply the 3DFACE command to create simple face surfaced models.
- Describe geometry defined meshes including rule surfaces, revolved surfaces, and tabulated surfaces.
- Apply the RULESURF, REVSURF, and TABSURF commands to apply mesh surfaces to 3D models.
- Describe a complex surface mesh and a region.
- Apply the 3DMESH, REGION, and SUBTRACT commands.
- Describe a 3D polyline and how it compares to a 2D polyline.
- Apply the 3DPOLY command and draw 3D polylines.
- Apply the EDGESURF command.
- Apply the PEDIT, SURFTYPE, SPLFRAME, SURFV, and SURFU commands and system variables to modify the appearance of 3D meshes.
- Within a five hour time limit, complete a written exam and the lab exercises without the aid of a key.

Intro to AutoCAD 3D: 05 Part 5

- Explain and model the SWEEP area to create solid models by sweeping a closed profile along a path.

- Describe and apply the HELIX command to create solid models of springs, coils, and threads.
- Describe and apply the LOFT command to create solid or surface models by blending them between two or more cross sections.
- Describe and apply the MASSPROP commands to find the mass properties of solid models.
- Within a three hour time limit, complete a written exam and the lab exercise without the aid of a key.

AutoCAD for Interior Designers

AutoCAD for Interior Designers: 01 Introduction

- Understand the AutoCAD start screen
- Set AutoCAD units
- Understand how to use the Status Bar icons in AutoCAD
- Customize screen background in AutoCAD
- Open, save, and close a file in AutoCAD

AutoCAD for Interior Designers: 03 Commands Set #2

- Draw a rectangle In AutoCAD
- Explode compound objects in AutoCAD
- Offset objects in AutoCAD
- Use construction lines in AutoCAD
- Trim and extend in AutoCAD

AutoCAD for Interior Designers: 04 Apartment Project Phase #1

- Completion

AutoCAD for Interior Designers: 07 Commands Set #4

- Work with objects in the model space and paper space in AutoCAD
- Prepare your drawing for output in paper space in AutoCAD

AutoCAD for Interior Designers: 08 Commands Set #5

- Create a block definition in AutoCAD from selected objects
- In AutoCAD, insert blocks into a current drawing
- Organize access to drawings, blocks, hatches, and other drawing content in AutoCAD using DesignCenter®
- In AutoCAD, manage drawings inserted as external references (xrefs)

- Manage layers and layer properties in AutoCAD
- Set the global linetype scale factor in AutoCAD

AutoCAD for Interior Designers: 09 Apartment Project Phase #3

- Completion

AutoCAD for Interior Designers: 11 Apartment Project Phase #4

- Completion

AutoCAD for Interior Designers: 13 Apartment Project Phase #5

- Completion

AutoCAD for Interior Designers: 14 Final Project Phase #1

- Completion

AutoCAD for Interior Designers: 02 Commands Set #1

- Draw a line in AutoCAD
- Draw a circle in AutoCAD
- Erase an object in AutoCAD
- Use different selection methods in AutoCAD

AutoCAD for Interior Designers: 05 Commands Set #3

- Measure in AutoCAD
- Understand the property data for selected objects in AutoCAD
- Round the edges of two objects in AutoCAD
- Bevel the edges of two objects in AutoCAD
- Move objects a specified distance in a specified direction in AutoCAD
- Copy objects a specified distance in a specified direction in AutoCAD
- Rotate objects around a base point in AutoCAD
- Create a mirrored copy of selected objects in AutoCAD
- Create copies of objects arranged in a pattern in AutoCAD
- Create copies of objects arranged in a pattern in AutoCAD

AutoCAD for Interior Designers: 06 Apartment Project Phase #2

- Completion

AutoCAD for Interior Designers: 10 Commands Set #6

- Create, modify, and set named text styles in AutoCAD

- Use multiline and single-line text in AutoCAD
- Use create new, set the current, and modify dimensions styles in AutoCAD
- Create a dimension substyle in AutoCAD
- Create several types of dimensions for a variety of object types in AutoCAD
- Set up layouts in template drawing in AutoCAD
- Create, modify, and delete multileader styles in AutoCAD

AutoCAD for Interior Designers: 12 Commands Set #7

- Create table object in AutoCAD
- Create an arc in AutoCAD
- Create an ellipse in AutoCAD
- Create a polyline in AutoCAD
- Create a spline in AutoCAD
- Create a hatch pattern or solid fill in AutoCAD
- Create a gradient hatch in AutoCAD

AutoCAD for Interior Designers: 15 Final Project Phase #2

- Completion

Basic Blueprint Reading

Basic Blueprint Reading

- Identify and interpret different types of lines used in blueprints
- Visualize and understand the spatial relationships between components based on blueprints.
- Create accurate technical sketches of welding details
- Apply scaling techniques to represent desired size and proportion in blueprints
- Interpret dimensions precisely and understand their relevance in welding projects.

Basic Lighting for Electricians: Level 1

Basic Lighting for Electricians: Level 1 02: Common Lighting Units and Measurement

- Develop a comprehensive understanding of common lighting units and measurement, including luminous flux, candela, and luminous flux density. Gain proficiency in interpreting and applying these units to accurately quantify and evaluate the intensity, brightness, and distribution of light in various lighting applications.
- Master the concept and application of the illumination equation in the context of basic lighting principles. Gain the ability to calculate and analyze illumination levels based on

the key variables involved, such as luminous flux, distance, and surface area. Develop the skills necessary to determine appropriate lighting levels for different environments and effectively design lighting systems to meet specific requirements.

- Master the essential concepts of common lighting units and measurements, including luminous flux, lumens, watts, and their practical application in evaluating different lighting sources like incandescent, fluorescent, and LED. Gain proficiency in working with ballasts and drivers to ensure efficient and effective lighting solutions
- Develop a solid understanding of common lighting units and measurements, including the interpretation and application of letter codes and numerical designations, enabling effective communication and comprehension in lighting specifications and installations.

Basic Lighting for Electricians: Level 1 03: Incandescent Lamps

- Develop a thorough understanding of incandescent lamps, including their letter code and numerical designation systems, in-rush current characteristics, and factors such as lamp lumen depreciation and luminaire dirt depreciation, to effectively assess, install, and maintain incandescent lighting systems
- Gain comprehensive knowledge of incandescent lamps, including their construction, working principles, use of quartz, and the regeneration cycle, enabling proficient handling, troubleshooting, and optimization of incandescent lighting systems in various electrical applications.

Basic Lighting for Electricians: Level 1 04: LEDs

- Develop a strong understanding of LEDs, including the principles of semiconductor materials, the functions of the cathode and anode, the role of phosphor coating, and the comparison with fluorescent lighting.
- Gain a comprehensive understanding of LEDs (Light-Emitting Diodes), including their principles of operation, structure, and applications. Develop the knowledge and skills to select, install, and troubleshoot LED lighting systems effectively. Learn about the benefits of LEDs, such as energy efficiency, durability, and versatility, and explore their role in modern lighting design and technology.
- Acquire comprehensive knowledge of LEDs, encompassing the operation of LED drivers, the process of rectification, the characteristics and properties of semiconductor materials, and the concept of negative temperature coefficient. Develop the skills necessary to effectively troubleshoot, install, and maintain LED lighting systems, ensuring optimal performance, energy efficiency, and compliance with electrical standards and regulations.

- Master the principles of LED lighting efficiency by understanding and applying the efficacy equation. Gain proficiency in calculating and evaluating the efficacy of LED lighting systems, enabling informed decision-making regarding energy-efficient lighting solutions. Develop the skills to assess and optimize LED system performance, considering factors such as lumen output, power consumption, and overall energy savings.

Basic Lighting for Electricians: Level 1 05: Energy Savings Examples

- Understand the concept of "How long to pay for itself?" in relation to lighting systems, comparing the electrical costs of incandescent and LED lighting technologies. Learn how to calculate and analyze the energy consumption and associated costs of each lighting option over time.
- Develop the skills to evaluate the financial benefits and return on investment (ROI) of transitioning from incandescent to LED lighting. Gain insights into the long-term cost savings, energy efficiency, and maintenance advantages offered by LED technology, enabling informed decision-making for lighting upgrades and installations.

Basic Lighting for Electricians: Level 1 06: Edison Screw Bases

- Understand the principles of Edison Screw Bases in lighting systems, including the concepts of ungrounded conductor, grounded conductor, and identified conductor. Gain the knowledge and skills to correctly identify and differentiate these components in electrical installations, ensuring safe and compliant wiring practices in relation to Edison Screw Bases.
- Develop a comprehensive understanding of Edison Screw Bases used in lighting fixtures, including their design, components, and applications. Gain the knowledge and skills to identify, select, and install Edison Screw Bases correctly, ensuring efficient and safe electrical connections in lighting systems.

Basic Lighting for Electricians: Level 1 07: Common Switches

- Gain a solid understanding of common switches used in electrical installations, including their types, functions, and wiring principles. Develop the ability to identify, select, and properly install ungrounded switches in various lighting circuits, ensuring effective control and safe operation of electrical systems.
- Develop a comprehensive understanding of common switches utilized in electrical systems, with a particular focus on their role in establishing electrical connections. Acquire the knowledge and skills necessary to effectively install, operate, and

troubleshoot switch connections in lighting circuits, ensuring proper functionality and adherence to electrical safety standards.

- Develop a deep understanding of the principles behind 4-way switch wiring, enabling you to effectively control lighting fixtures from multiple locations. Acquire the necessary skills to troubleshoot and maintain 4-way switch setups, ensuring optimal performance and compliance with electrical safety regulations
- Develop a comprehensive understanding of common switches used in lighting circuits, including SPST (Single-Pole, Single-Throw) and DPST (Double-Pole, Single-Throw) switches.
- Master the fundamental concepts of common switches used in lighting circuits, with a specific focus on understanding their relationship to overcurrent protection. Gain expertise in selecting and installing switches that comply with electrical codes and regulations regarding overcurrent protection. Acquire the skills to identify and troubleshoot overcurrent issues in lighting systems, ensuring safe and efficient operation.
- Develop a comprehensive understanding of dimmer switches commonly used in lighting applications, including their functionality, installation, and control. Gain expertise in selecting and configuring dimmer switches to achieve desired lighting effects, optimize energy efficiency, and enhance user comfort. Acquire the skills to troubleshoot common issues related to dimmer switches, ensuring proper operation and compatibility with various types of lighting fixtures.

Basic Lighting for Electricians: Level 1 08: Common Switching Circuits

- Develop proficiency in interpreting and applying schematic and wiring diagrams for common switching circuits in lighting systems, enabling effective troubleshooting, circuit design, and accurate installation and maintenance.
- Gain a comprehensive understanding of common switching circuits, including SPST configurations, and the proper identification and utilization of ungrounded and grounded conductors, ensuring safe and effective operation of lighting systems.
- Develop proficiency in the application of dead-end switch wiring technique within common switching circuits, ensuring efficient utilization of wiring resources while maintaining electrical safety standards in lighting installations.
- Master the knowledge and skills necessary to effectively understand, select, and install different types of switches used in common switching circuits, ensuring proper functionality and safety in lighting systems.

Lighting for Electricians: Level 1 01: Properties of Light and Factors Affecting the Ability to See

- Demonstrate an understanding of the properties of light and the factors that affect the ability to see, including the concepts of visible light, the electromagnetic spectrum, wavelength, and the relationship between different regions of the electromagnetic spectrum.
- Comprehend and analyze the properties of visible light, including its characteristics, color temperature, and spectral distribution, as well as understand the factors that affect the ability to see, such as luminance, contrast, and glare, in order to make informed decisions regarding lighting installations and improve visual comfort and efficiency
- Evaluate the properties of light, including color rendering index (CRI), its significance in accurately representing colors, and the impact of low-pressure sodium (LPS) lighting on color perception, enabling them to make informed decisions regarding lighting installations and select appropriate lighting solutions to enhance visual perception and color fidelity.
- Understand light properties, including chromaticity, color temperature (Kelvin), and light quality, enabling them to make informed decisions for selecting suitable lighting solutions to enhance visual perception and create desired lighting atmospheres.
- Understand the impact on vision, including the roles of iris, pupil, cornea, lens, retina, rods, and cones, to effectively optimize lighting installations for enhanced visibility and visual comfort.
- Develop a comprehensive understanding of the fundamental properties of light, including quantity and quality, and their direct impact on visual perception, as measured by lumens and candela, enabling effective lighting design and implementation for optimal visibility and visual comfort.
- Gain a thorough understanding of the properties of light, including size, brightness, luminance, quality, and quantity, and their direct influence on visual perception and contrast. Explore the temporal aspects of lighting and how it affects human vision, enabling you to make informed decisions in lighting design and implementation for enhanced visibility and visual comfort.

Building Maintenance & Construction: Tools and Maintenance Tasks

CON 01: BM&C: Tools and Maintenance Tasks 00: Introduction

- Completion

CON 01: BM&C: Tools and Maintenance Tasks 01: Safety

- Describe and demonstrate safe use of common hand and power tools used to perform common maintenance and construction tasks

CON 01: BM&C: Tools and Maintenance Tasks 02: Hand & Power Tools

- Identify and perform basic preventive and reactive maintenance procedures for residential homes, apartments, and appliances.

CON 01: BM&C: Tools and Maintenance Tasks 03: Mathematics for Maintenance Techs

- Apply quantitative methods to common building maintenance tasks

CON 01: BM&C: Tools and Maintenance Tasks 04: Plumbing Systems

- Describe procedures for research, requisition, and procurement of materials and parts to complete construction and maintenance tasks and/or work orders.

CON 01: BM&C: Tools and Maintenance Tasks 05: Electrical Systems

- Describe procedures for research, requisition, and procurement of materials and parts to complete construction and maintenance tasks and/or work orders.

CON 01: BM&C: Tools and Maintenance Tasks 06: Maintenance Management Systems

- Identify and perform basic preventive and reactive maintenance procedures for residential homes, apartments, and appliances

Fundamentals of Building Construction Management

CON 02 Fundamentals of Building Construction Management 01: Introduction to the Building Industry

- Describe the characteristics of the AEC Industry
- Understand the variety of projects performed within the industry
- Describe the scope and scale of the industry

CON 02 Fundamentals of Building Construction Management 02: The Lifecycle of a Building Project

- Define the four primary phases of the lifecycle of a building project
- Describe various unique aspects of a building project in relation to the manufacturing industry
- Define the total cost of ownership, and the impact of decision timing on overall lifecycle cost

CON 02 Fundamentals of Building Construction Management 03: Project Participants and Roles

- Define the types of companies and organizations that exist in the Construction Industry
- Identify typical tasks and activities performed by the different types of organizations

CON 02 Fundamentals of Building Construction Management 04: Project Delivery Methods

- Understand the different aspects included in typical project delivery methods
- Define the impact of various organizational structures on delivering a project
- Describe the different payment methods for contractors on a project
- Explain the types of award methods for selecting team members
- Draw an organizational chart for multiple types of organizational structures
- Describe the meaning of "partnering" and "fast-tracking"

CON 02 Fundamentals of Building Construction Management 05: Introduction to Construction Cost Estimating

- Define typical cost estimating methods that are used within the Construction Industry
- Describe the types of cost information available to various participants within the industry
- Describe relative levels of accuracy for different estimating approaches

CON 02 Fundamentals of Building Construction Management 06: Rough Order of Magnitude (ROM) Cost Estimating

- Understand the benefits and limitations of the ROM estimating approach
- Develop a Rough Order of Magnitude estimate for a building project
- Perform cost estimate translations considering time factors and location factors
- Identify the appropriate locations to find the R.S. Means cost data tables used for ROM estimates

CON 02 Fundamentals of Building Construction Management 07: Modeled Square Foot (SF) Cost Estimating

- Describe the benefits and limitations of the Modeled Square Foot (SF) estimating approach
- Develop a Modeled Square Foot estimate for a building project
- Identify the appropriate locations to find the R.S. Means cost data tables used for Modeled Square Foot estimates

CON 02 Fundamentals of Building Construction Management 08: Assemblies Cost Estimating

- Describe the benefits and limitations of the assemblies estimating approach
- Develop an assemblies estimate for a building project
- Calculate the approximate cost differentials for selecting various system options for a project

CON 02 Fundamentals of Building Construction Management 09: Unit Price Cost Estimating

- Describe the benefits and limitations of the unit cost estimating approach
- Develop a unit cost estimate for a portion of a building project
- Identify the detailed cost components within a unit price estimate, and how these cost elements are calculated

CON 02 Fundamentals of Building Construction Management 10: Procurement and Purchasing

- Describe how various trade contractor scopes of work are procured (purchased) on a construction project
- Understand the concepts of "scope bust" and "bid shopping"

CON 02 Fundamentals of Building Construction Management 11: Value Engineering

- Define Value Engineering in the context of delivering a construction project.
- Understand the core characteristics of a valuable VE element.

CON 02 Fundamentals of Building Construction Management 12: General Conditions and Project Staffing

- Define the elements contained within general conditions for a project.
- Understand the typical organizational structure and job tasks of different participants on a project.
- Be able to define and draw a typical organizational structure for a construction firm, and understand how it differs from typical manufacturing or service organizations.

CON 02 Fundamentals of Building Construction Management 13: Designing a Site Utilization Plan

- Define the items needed in a site utilization plan.
- Understand the core concepts for designing the site utilization plan for various stages of a project.

- Be able to define and draw a site utilization plan for a project.

CON 02 Fundamentals of Building Construction Management 14: Introduction to Project Scheduling

- Define the different types of schedules that may be developed for managing the activities and phases of a project
- Understand the purpose of various schedule types and presentation approaches
- Understand the complexity and planning effort required to develop different types of schedules

CON 02 Fundamentals of Building Construction Management 15: Network Scheduling

- Define the various terms used in the development of network schedules, e.g., critical path, total float, and free float.
- Develop a network diagram of a schedule and calculate the start/finish times and float values.
- Identify the critical path activities within a network diagram which includes float time values.

CON 02 Fundamentals of Building Construction Management 16: Risk and Contract Management

- Understand the concept and core definitions related to risk management approaches for building construction projects.
- Identify the different types of risk management instruments used to manage project risks.
- Define the main types of insurance and bonds that owners, designers, and constructors may use on a project, along with understanding the frequency of use.

CON 02 Fundamentals of Building Construction Management 17: Introduction to Project Management and Control

- Describe the many aspects of a project that need to be managed to ensure a successful construction project
- Define four management areas that are frequently referenced as the Golden Triangle, which require close management of constraints and expectations

CON 02 Fundamentals of Building Construction Management 18: Schedule Management

- Understand the approach and information needed to update a construction schedule

- Identify the schedule impact of job progress on an as-planned schedule following a schedule update
- Describe the concepts related to schedule optimization, schedule reduction, and resource loading of a CPM schedule

CON 02 Fundamentals of Building Construction Management 19: Cost and Financial Management

- Describe the core concepts required to effectively manage the costs and finances on a project
- Describe the evolution of a construction cost estimate into a cost budget.
- Draw and analyze a cash flow diagram, and understand the impact of the timing of income and expenses on a project.
- Calculate the anticipated monthly payments for a project given expenditure, a project schedule, and contractual terms related to payments.

CON 02 Fundamentals of Building Construction Management 20: Quality Management

- Understand the elements of a quality management program
- Define quality planning, quality assurance and quality control.
- Determine core components of the various quality management program items.

CON 02 Fundamentals of Building Construction Management 21: Safety Management

- Understand that safety can never be compromised for other aspects of a construction project
- Be able to define the importance of safety from an ethical and an economic perspective
- Define effective safety management approaches to improve overall safety on construction projects
- Be able to identify OSHA safety guideline locations and general reporting requirements
- Understand the impact of construction accidents on projects

CON 02 Fundamentals of Building Construction Management 22: Information Management

- Describe the various sources of information that are shared between project participants
- Describe the information management process
- Define the role of information management throughout the project lifecycle
- Understand the importance of contractual and non-contractual information

CON 02 Fundamentals of Building Construction Management 23: Introduction to Lean Construction

- Define lean construction
- Understand the types of waste on construction projects
- Be able to list various methods used on projects to increase value and reduce waste
- Describe the Last Planner System
- Understand the process to develop a Lean Deployment Plan for a project

CON 02 Fundamentals of Building Construction Management 24: The Future of the Construction Industry

- Understand the trends that are impacting the future of the construction industry
- Describe the characteristics that need to change to advance the construction industry
- Assess your role in advancing the industry and your future knowledge and skills

CON 02 Fundamentals of Building Construction Management: Reference Materials

- Completion

Introduction to Architecture

Introduction to Architecture

- Define the different types of function and apply them to architectural examples
- Evaluate structures in their own community based on the Vitruvian Triad
- Compare and contrast the different architectural structures presented here based on their functional and formal qualities
- Evaluate the importance of the built environment and its impact on the surrounding landscape and people
- Use an example of Anne Tyng's work to describe her use of geometric forms
- Describe what it means to inhabit geometry
- Consider how light is used to express architectural form
- Compare and contrast Louis Kahn and Anne Tyng's careers in the architecture field
- Identify and define the key visual elements of architecture
- Discuss Julian Abele's contributions to American architecture
- Examine Abele's work in the context of the racial discrimination he faced as an African-American architect
- Apply the visual elements of architectures to their own experience of the built environment
- Identify and define different types of architectural space

- Describe and Deconstructivist architectural style and apply it to Zaha Hadid's work
- Compare and contrast Hadid's work with Daniel Libeskind's, discussed in the Defining Architecture chapter of this text
- Define incremental housing
- Explain the process of participatory design
- Use specific examples from the material presented in this lesson to evaluate the four areas of support needed to implement incremental housing
- Argue for or against offering architectural plans for free
- Evaluate the role architects can play in solving real-world problems through design
- Define LEED and the Living Building Challenge
- Describe key features of green architectural design
- Compare and contrast the strategies of LEED and the Living Building Challenge

Pointful Education

Architectural Design I

Architecture_01 Arch 00: Principles of Architecture Module 0

- Completion

Architecture_01 Arch 01: Basic Drafting

- Use and maintain drafting equipment, measuring scales, drafting instruments, and reproduction equipment.
- Identify and use the various drafting media and techniques and demonstrate the use of the alphabet of lines.
- Prepare title blocks and other drafting formats and use various freehand and other lettering techniques.
- Develop skill in sketching and mark making to plan, execute and construct two-dimensional images or three-dimensional models, including presentation graphics.
- Apply geometric construction techniques and solve geometric, algebraic, and trigonometric problems related to drafting.
- Demonstrate care of equipment and apply use of effective and accurate architectural and/or engineering vocabulary throughout design and drafting process.

Architecture_01 Arch 02: Design and Drawings Part I

- Analyze challenges and identify solutions for design problems.

- Investigate the use of space, scale and environmental features to create three-dimensional form, or the illusion of depth and form.
- Analyze and apply data and measurements to solve problems and interpret drawings.
- Prepare multi-view scaled drawings.
- Select proper drawing scale, views and layout.

Architecture_01 Arch 03: Design and Drawings Part II

- Prepare drawings containing horizontal and vertical surfaces.
- Prepare drawings containing circles and/or arcs.
- Prepare removed details and conventional breaks.
- Prepare drawings containing full sections and half sections.
- Prepare drawings containing offset sections.

Architecture_01 Arch 04: Design and Drawings Part III

- Prepare drawings containing revolved sections.
- Prepare drawings containing removed sections and broken-out sections.
- Prepare a sectional assembly drawing applying material symbols.
- Prepare drawings containing primary auxiliary views.
- Prepare drawings containing auxiliary views that include curved lines.

Architecture_01 Arch 05: Dimensioning and Annotation

- Prepare drawings containing linear, angular and circular standard dimensions.
- Prepare drawings using general and local notes.
- Apply basic tolerance techniques and nominal and actual dimensions.

Architecture_01 Arch 06: Working Drawings

- Prepare assembly drawings.
- Prepare detail drawings.
- Prepare technical drawings.
- Modify drawings to include material specifications and parts list.

Architecture_01 Arch 07: Pictorial Drawings and Surface Developments

- Prepare pictorial drawings using 2D sketching and/or CAD software
- Prepare isometric, oblique and other pictorial drawings.
- Prepare one-point and two-point perspectives.
- Prepare presentation graphics.
- Prepare developments of prisms, cylinders, cones and pyramids.

Architecture_01 Arch 08: Sequential Processes Part I

- Demonstrate organizational skills to influence the sequential process when creating drawings.
- Construct geometric figures of lines, splines, circles, arcs, etc., to represent plans and/or mechanical assemblies.
- Create and edit text using appropriate style and size to annotate drawings.
- Create and use multi-leaders.
- Use control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- Use editing commands.
- Use viewing commands to perform zooming and panning.

Architecture_01 Arch 09: Sequential Processes Part II

- Plot drawings on media using layout and scale.
- Use query commands to interrogate database for entity characteristics, distance, area, and status.
- Apply standard dimensioning rules.
- Move, stretch and offset objects.
- Create a radius between objects.
- Trim and extend objects.
- Break and join objects.

Architecture_01 Arch 10: Sequential Processes Part III

- Create and edit dimensions and work with dimension styles.
- Change object properties.
- Crosshatch objects.
- Apply external references.
- Isolate and hide objects.
- Use selection set methods.

Architecture_01 Arch 11: Sequential Processes Part IV

- Use rectangular and polar arrays.
- Use rotation reference angles.
- Use elements of creativity and organizational principles to create visually coherent views and layouts.
- Create and manage layers or levels.

- Use page setup for plotting.

Architecture_01 Arch 12: Sequential Processes Part V

- Create, insert and edit. reusable content such as symbols and blocks or cells.
- Use specific line types.
- Create fills and gradients.
- Edit hatch patterns and fills.

Architecture_01 Arch 13: Three-Dimensional Drawing Part I

- Use coordinate systems to locate objects in three dimensional space
- Use basic geometric shapes available in two-dimensional and three-dimensional modeling software.
- Define the parameters used for determining size, placement, and orientation of a modeling object.
- Describe the Boolean modeling operations of union, subtraction, and intersection.
- Demonstrate extrusion or sweeping techniques that transform two-dimensional objects into three-dimensional objects.
- Describe the "revolve" or "lathe" techniques for animating a two-dimensional object and give examples of their application.
- Use scale, rotate, and move actions that comprise the transformation technique for animating a three-dimensional object.

Architecture_01 Arch 14: Three-Dimensional Drawing Part II

- Use basic viewing navigation tools such as zoom, rotate and panning.
- Work with materials, techniques, and processes through practice and perseverance to create desired result in two-dimensional and three-dimensional models.
- Analyze challenges and identify solutions for three-dimensional design problems.
- Investigate the use of space, scale, and environmental features within a model to create three-dimensional form or the illusion of depth and form.
- Apply materials, ideas, images, and/or equipment from other content areas to generate ideas and processes for the development of three-dimensional models.

Architecture_01 Arch 15: Course Wrap-up/Final Exam

- Completion

Architectural Design II

Architecture_02 00 - Start Here

- Completion

Architecture_02 01: Basic Architectural Drawings

- Solve design problems, through convergent and divergent thinking, to gain new perspectives.
- Apply critical thinking and problem-solving skills to develop creative solutions for design problems.
- Draw a site plan and a floor plan.
- Draw interior and exterior elevations.
- Draw roof plan, wall sections, and a plot plan.

Architecture_02 02: Basic Architectural Drawings Part II

- Prepare door/ window schedules.
- Draw electrical plan.
- Review and revise plans throughout the design process to refine and achieve design objective.
- Demonstrate flexibility and adaptability throughout the design process.
- Define a basic project materials list.
- Calculate a basic project quantity take-off.

Architecture_02 03: Basic Computer-Aided Drafting Functions Part I

- Demonstrate organizational skills to influence the sequential process when creating drawings.
- Construct geometric figures of lines, splines, circles and arcs.
- Create and edit text using appropriate style and size to annotate drawings.
- Use control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- Use editing commands as well as viewing commands to perform zooming and panning.

Architecture_02 04: Basic Computer-Aided Drafting Functions Part II

- Plot drawings on media using layout and scale.
- Use query commands to interrogate database for entity characteristics, distance, area, and status.
- Apply standard dimensioning rules.

- Demonstrate an ability to move, stretch and offset objects; create a radius between objects; trim and extend objects; break and join objects, create and edit dimensions; and change object properties.

Architecture_02 05: Basic Civil Drawings

- Apply use of effective and accurate civil terminology throughout the design process.
- Read and interpret civil drawings.
- Draw plan and profile drawings.
- Develop topographic drawings.

Architecture_02 06: Preparing Computer-Aided Drawings (CAD) Part I

- Demonstrate the ability to draw a floor plan, draw a site plan, draw exterior and interior elevations and draw a roof plan.
- Prepare door and window schedules.
- Demonstrate the ability to draw a wall section, draw an overall site plan, draw a building plot plan, and draw an electrical plan.

Architecture_02 07: Preparing Computer-Aided Drawings (CAD) Part II

- Research the history of the built environment.
- Describe the significance of major architects, engineers or inventors to understand their historical influences.
- Research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
- Identify transitions in design media, technique and focus to explain how technology has changed design throughout history.

Architecture_02 08: Preparing for the Autodesk Certified User (CAD) Exam

- Understand the requirements for the Autodesk Certified User (CAD) Certification.
- Understand the structure of the CAD exam.
- Demonstrate readiness for the CAD exam.
- Explore the job opportunities for an Autodesk Certified Users.

Architecture_02 09: Course Wrap-up/Final Exam

- Completion

Architectural Design III

Architecture_03 00: Module 0

- Completion

Architecture_03 01: Computer-Aided Drafting Functions Part I

- Create and use multi-leaders.
- Draw lines, arcs, circles, etc. to represent plans and/or mechanical assemblies.
- Create text styles, text justification and multi-line text.
- Edit dimensions.
- Work with dimension styles.

Architecture_03 02: Computer-Aided Drafting Functions Part II

- Crosshatch objects.
- Apply external reference; isolate and hide objects.
- Use selection set methods.
- Use rectangular and polar arrays.
- Use rotation reference angles.
- Use elements of creativity and organizational principles to create visually coherent viewports and layouts.

Architecture_03 03: Computer-Aided Drafting Functions Part III

- Create and manage layers.
- Use page setup for plotting.
- Create, insert, and edit reusable content such as symbols and blocks.
- Use specific line types.
- Create fills and gradients.
- Edit hatch patterns and fills.

Architecture_03 04: Professional Ethics and Legal Responsibilities

- Evaluate and justify decisions based on ethical reasoning.
- Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities and employer policies.
- Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
- Interpret and explain written organizational policies and procedures.

- Demonstrate personal responsibility, ethics and integrity, including respect for intellectual property, when accessing information and creating design projects.

Architecture_03 05: Career Opportunities in Drafting

- Identify and demonstrate positive work behaviors needed to be employable.
- Develop and use criteria to select works for a digital career portfolio.
- Evaluate and compare employment opportunities that match career goals.
- Examine licensing, certification, education, and industry credentialing requirements for careers in design and construction industry.
- Identify opportunities and research requirements for career advancement.

Architecture_03 06: Course Wrap-up/Final Exam

- Completion

Architecture_03 07: Architectural Drafting Project

- Completion

Building Maintenance Technologies

BuildMT 00: Module 0

- Completion

BuildMT 01: Health, Safety, and Environmental Management Systems

- Understand the role and the purpose of the Occupational Safety and Health Administration (OSHA) rules and regulations.
- Identify and locate Safety Data Sheets (formerly called Material Safety Data Sheets (MSDS)) and follow the procedures as necessary.
- Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- Identify and use safety equipment and personal protective equipment (PPE).
- Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
- Explain emergency procedures to follow in response to workplace accidents.

BuildMT 02: The Construction Industry Part I

- Describe the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
- Describe the benefits of the construction industry on health and safety, communication, transportation and the economy.

- Demonstrate an understanding of the relationship between construction and the environment.
- Describe the role of trade unions in the construction industry and research apprenticeship opportunities.
- Identify the different classifications of construction projects.

BuildMT 03: The Construction Industry Part II

- Define the roles and responsibilities of the general contractor, specialty contractor, construction management and design build firms.
- Research construction trade occupations and the roles and responsibilities of each craft.
- Research construction management occupations and the roles and responsibilities of each.
- Identify design and engineering occupations and the roles and responsibilities of each.
- Explain the relationship between construction and the economy.
- Describe the process of applying for building permits and variances and demonstrate an understanding of zoning requirements.

BuildMT 04: Basic Hand and Power Tools

- Describe the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
- Identify and use various common screwdriver and drill bit types.
- Select and use various types of non-adjustable wrenches, adjustable wrenches and plumbing tools, chisels and punches, pliers, ripping bars and nail pullers, woodworking files, spirit levels, socket wrench sets, hand or block sanders, carpenters' squares, clamps and shovels.
- Identify power tools including sanders, drills, circular saws, jig saws, reciprocating saws, radial-arm saws, table saws, band saws miter saws, drill presses, grinders, electric routers and pneumatic nailers.
- Describe the proper operation of power tools and equipment.

BuildMT 05: Construction Math Part I

- Solve job-related problems by adding, subtracting, multiplying and dividing numbers, using fractions, decimals and whole numbers.
- Change numbers to percentages.
- Demonstrate knowledge of arithmetic operations.

- Read a ruler and a tape measure.
- Compute feet, inches and yards.

BuildMT 06: Construction Math Part II

- Change hours and minutes to decimals, fractions and mixed numbers.
- Analyze and apply data and measurements to solve problems and interpret documents.
- Determine ratios and proportions.
- Convert decimals to fractions and fractions to decimals.
- Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.

BuildMT 07: Carpentry

- Dry in a structure.
- Construct various types of concrete forms.
- Describe in-beds used in concrete formwork.
- Identify appropriate form stripping and handling techniques.
- Lay out and install framing members for a structure.

BuildMT 08: Construction Drawings

- Identify basic construction drawing terms, components and symbols.
- Locate sections, elevations and details to their location on the plan view.
- Use drawing dimensions to lay out a construction project.
- Read architectural scales.

BuildMT 09: Framing Floor Systems Part I

- Identify floor and sill framing and support members.
- Name the methods used to fasten sills to the foundation.
- Understand how girder/beam and joist sizes are selected.
- Identify different types of floor joists.
- Identify different types of bridging.

BuildMT 10: Framing Floor Systems Part II

- Identify different types of flooring materials.
- Match selected fasteners used in floor framing to their correct uses.
- Estimate the amount of material needed to frame a floor assembly.
- Demonstrate the ability to lay out and construct a floor assembly, install bridging, joists, subfloor and a single floor system

- Explain the purposes of subflooring and underlayment.

BuildMT 11: Framing Walls and Ceilings Part I

- Identify the components of a wall and ceiling layout.
- Lay out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing and the use of fire stops where applicable.
- Describe the correct procedure for assembling and erecting an exterior wall.
- Identify the common materials and methods used for installing sheathing on walls.
- Lay out, assemble, erect, and brace exterior walls for a frame building.

BuildMT 12: Framing Walls and Ceilings Part II

- Describe wall framing techniques used in masonry construction.
- Explain the use of metal studs in wall framing.
- Demonstrate correct procedure for laying out ceiling joists.
- Cut and install ceiling joists on a wood frame building.

BuildMT 13: Framing a Roof

- Define the terms associated with roof framing.
- Identify the roof framing members used in gable and hip roofs.
- Calculate the length of a rafter using various methods.
- Identify the various types of trusses used in roof framing.
- Use a rafter framing square, speed square and calculator in laying out a roof.
- Identify various types of sheathing used in roof construction.
- Frame a gable roof with vent openings.
- Frame a roof opening.
- Erect a gable roof using trusses.
- Estimate the materials used in framing and sheathing a roof.

BuildMT 14: Course Wrap-up/Final Exam

- Completion

Building Maintenance Technologies II

BuildMTII00: Building Maintenance Technologies II

- Completion

BuildMTII01: Construction Documents, Contracts, and Specifications

- Explain the purpose and components of contract documents and specifications.

- Read, interpret, and apply plans, elevations, sections and details.
- Explain the relationships of the elements of contract documents.
- Create lists of materials and prepare estimates.
- Use architectural and engineering scales.

BuildMTII02: Drafting and Federal Codes

- Compare various computer-aided drafting (CAD) and building information modeling (BIM) products and how they can be used by designers and construction project managers.
- Compare and analyze traditional drafting with computer-aided drafting (CAD) and building information modeling (BIM) to learn how technology has altered opportunities for innovative responses and results.
- Investigate the use of technology and other resources to inspire design decisions.
- Identify and locate local, state and federal codes, regulations and standards.
- Identify local, state and federal regulatory agencies.

BuildMTII03: Project Costs and Scheduling Part I

- Understand the need to add, remove or relocate fill to proper compaction.
- Understand zoning requirements.
- Understand property lines and building setbacks.
- Determine elevations.
- Lay out and mark building location and elevation.
- Clean and maintain the site.

BuildMTII04: Project Costs and Scheduling Part II

- Calculate material quantities and purchase cost (including sales tax).
- Calculate labor costs including work hours, duration and cost of workers.
- Explain and compute federal, state and local taxes.
- Schedule various construction activities.

BuildMTII05: The Built Environment Part I

- Research the development of construction technology, its impact on the built environment, and the impact of growth on the construction industry.
- Describe and give examples of the influences and benefits of the construction industry on health and safety, communication, transportation, and the economy.
- Examine and compare the relationship between the built environment and the natural environment.

- Compare architectural designs and/or models to understand how technical and utilitarian components impact aesthetic qualities.

BuildMTII06: The Built Environment Part II

- Research the development of construction technology, its impact on the built environment, and the Analyze changes in architectural styles and construction practices over time relative to various environments. of growth on the construction industry.
- Describe the significance of major architects, engineers or inventors to understand their historical influences.
- Research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
- Identify transitions in design media, technique, and focus to explain how technology has changed design throughout history.

BuildMTII07: Sustainability Issues

- Describe the impact of the construction industry on the natural environment.
- Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
- Recommend sustainable alternatives to conventional construction practices.
- Identify specific practices that can lessen adverse impacts on the environment.
- Understand holistic green construction.

BuildMTII08: Construction Projects

- Manipulate materials, techniques, and processes through practice and perseverance using malleable and/ or rigid materials to create a 3-dimensional representational or abstract model.
- Use divergent thinking, abstract reasoning, and various processes to demonstrate imaginative or innovative solutions for a project.
- Develop competence and dexterity through practice in the use of processes, tools and techniques.
- Solve design and construction problems, through convergent and divergent thinking, to gain new perspectives.
- Apply critical-thinking and problem solving skills used in design to develop solutions for real-life issues.
- Use critical thinking skills for various contexts to develop, refine, and reflect on a design theme.

- Use and maintain tools and equipment to facilitate design and construction process.
- Work in a project team to show creative cohesiveness, team building, respectful compromise, and time-management skills.

BuildMTII09: Course Wrap-up/Final Exam

- Completion

Future of Home Construction

FHC 00: Module 0 - Start Here

- Completion

FHC 01: Introduction to Home Construction

- Examine the timeline of how construction started and has evolved in the United States
- Describe how the economy impacts the home construction industry
- Discuss the growth of the home construction industry as it relates to economic trends and population growth in the United States
- Identify the costs associated with building and maintaining a home
- Examine the impact that technology has and will have on the home construction industry

FHC 02: Academic Foundations for Careers in Construction

- Use appropriate formulas to determine measurements of dimensions, spaces, and structures.
- Evaluate the necessity of basic mathematics in home construction and use basic math functions to complete job site/workplace tasks
- Use geometric formulas to determine areas and volumes of various structures
- Use appropriate formulas to determine percentages /decimals
- Use appropriate formulas to determine ratios, fractions, and proportion measures.

FHC 03: Technical Skills in Home Construction

- Recognize elements and symbols of blueprints and drawings
- Interpret and explain standards and specifications
- Use architect's plan, manufacturer's illustrations, and other materials to communicate specific data and visualize proposed work
- Select tools, machinery, equipment, and resources that match requirements of the job
- Read current periodicals, industry publications, and manufacturer's catalogs

FHC 04: Project Planning in Home Construction

- Plan, organize, schedule, and manage a project/job to optimize workflow and outcome
- Estimate resources/materials required for a specific project or problem
- Use available resources/materials effectively while completing a project or resolving a problem with a project plan
- Determine alternative solutions for a specific project/problem
- Generate a project update that tracks changes necessitated by unexpected events and conditions

FHC 05: Safety and Health in Home Construction

- Demonstrate methods to correct common design and construction hazards
- Identify types and sources of workplace hazards common to design and construction situations
- Demonstrate principles of safe physical movement to avoid slips, trips, and spills
- Inspect and use personal protective equipment (PPE)
- Locate and identify specific organizational policy, rule, or procedure to assist with a given situation

FHC 06: Contracts and Regulations in Home Construction

- Understand contractual relationships with all parties involved in the building process to ensure successful build of a project.
- Design and implement submittal approval procedures to ensure effective flow of information in construction process.
- Understand construction subcontracts and manage working relationships on a project.
- Locate appropriate information on organizational policies in handbooks and manuals.
- Discuss how specific organizational policies and rules influence a specific work situation.

FHC 07: Careers in Home Construction

- Identify the various roles in the construction of a home
- Discuss the physical responsibilities within each role in the construction of a home
- Explore the safety regulations associated with each role in the construction of a home
- Identify the certifications or legal requirements necessary for each role in the construction of a home
- Evaluate the compensation and expectations for each role in the construction of a home

FHC 08: Owning a Construction Business

- Describe the steps necessary to start a construction business
- Evaluate the pros and cons to opening a Sole Proprietorship, S-Corporation, or C-Corporation
- Identify the roles necessary within the office of a construction company
- Analyze the cost difference between having full-time employees as opposed to contractors
- Describe strategies used to promote collaboration, trust, and clear communication among contractors, suppliers, clients, and others on a job site

FHC 09: Green Construction

- Describe the differing components between a home construction and a green home construction project
- Define green construction and discuss its benefit to the environment
- Evaluate green materials which may be used in place of traditional construction materials
- Compare and contrast the benefits of green roofs and solar roofs
- Analyze the cost benefit over time to homeowners in building a green home

FHC 10: The Future of Home Construction

- Identify new and emerging technologies in green construction
- Discuss the potential impact of robotics to construction and green construction
- Evaluate the potential impact of artificial intelligence advances to construction and green construction
- Discuss the future of home construction as it relates to population growth
- Compare and contrast Smart home construction and green home construction

FHC 11: Final Exam

- Completion

LEED Green Associate

LEED 00: Start Here

- Completion

LEED 01: Introduction to the LEED Process

- Understand the mission, vision and non-profit role of USGBC/GBCI
- Identify the structure and scope of each LEED rating system

- Evaluate the LEED development process
- Understand credit and Impact categories
- Outline the LEED certification process and other rating systems

LEED 02: Integrative Strategies

- Understand the Integrative process
- Evaluate the duties and roles of project team members
- Identify the education requirements for each integrative team member
- Analyze the standards that support LEED

LEED 03: Location, Transportation, and Sustainable Sites

- Identify the thought components of site selection
- Investigate alternative transportation types, access, and quality
- Evaluate the infrastructure and design of alternative transportation
- Identify the thought components of site assessment
- Evaluate the components of site design and development

LEED 04: Water Efficiency

- Identify the green alternatives for outdoor water efficiency
- Identify the green alternatives for indoor water efficiency
- Evaluate the types and quality of indoor water-efficient appliances and fixtures
- Understand water performance management over the lifetime of a structure

LEED 05: Energy and Atmosphere

- Identify the components of building loads
- Identify the green alternatives for outdoor energy efficiency as well as energy auditing
- Analyze alternative and renewable energy practices
- Understand energy performance management over the lifetime of a structure
- Evaluate environmental concerns associated with energy management

LEED 06: Materials and Resources

- Describe the need for reuse of materials and resources
- Evaluate life-cycle impacts including life-cycle assessment
- Identify the types of waste
- Analyze the components of a waste management plan
- Evaluate the need for purchasing and disclosures as related to the EPP

LEED 07: Indoor Environmental Quality

- Identify the risk factors to indoor air quality
- Identify the green alternatives for indoor air quality
- Understand the need and value of lighting quality and the various green alternatives
- Identify the green alternatives of acoustics
- Evaluate the value and tools to support occupant comfort, health, and satisfaction

LEED 08: Project Surroundings, Public Outreach, and Exam Preparation

- Evaluate the environmental impacts of the built environment
- Understand the relationship between LEED and codes
- Analyze the values of sustainable design
- Understand the need for regional green design and construction measures
- Understand the structure and requirements of the LEED Green Associate Certification Exam

LEED 09: Course Wrap-up/Final Exam

- Completion

Teach Construction

Basic Power Saws

Basic Power Saws: Circular Saw

- Demonstrate the proper use of a circular saw and techniques that lead to safe, accurate, and straight cutting.
- Understand the difference between a direct and worm gear saw, how they operate, and the pros and cons of each.

Basic Power Saws: Jigsaw

- Demonstrate the proper use of a jigsaw and techniques that lead to safe, accurate, and straight, and curved cutting.
- Identify the parts and features of a jigsaw and its adjustments.

Basic Power Saws: Miter Saw

- Describe the proper way to carry, set up for use, and tear down a miter saw.
- Identify the different parts and features of a miter saw and how they affect the way the tool works.

- Describe the difference between a miter and a bevel setting and the pros and cons of each.
- Demonstrate the proper use of a miter saw and techniques that lead to safe and accurate cuts.

Basic Power Saws: Reciprocating Saw

- Identify circumstances when a reciprocating saw can be useful for cuts.
- Identify the parts and features of a reciprocating saw and their adjustments.

Basic Power Saws: Saw Blades

- Demonstrate the process of blade changes for various power saws.
- Describe blades for different power saws, variations of tooth count and blade materials, and other aspects like blade size or length and thickness.
- Describe the concept of blade kerf and how to compensate for it when making an accurate cut with various power saws.

Basic Power Saws: Table Saw

- Identify the parts and features of a table saw and its adjustments.
- Demonstrate the proper use of a table saw and techniques that lead to safe, accurate, and straight rip cuts.

Basic Tools & Materials for Carpentry and Construction

Cordless Drill

- Identify different driver bits and match them to the correct fastener.
- List the basic parts of a standard cordless drill and learn the methods of installing and removing bits and drivers.
- Explain how the controls change the way the tool operates including the speed control setting, the clutch setting, forward and reverse switch, variable speed trigger.

Fasteners

- Identify different fastener coating options and describe the purpose of each.
- List and describe common nail types used for building.
- List and describe common screw types used for building.

Hand Tools

- Identify common hand tools and facts about each including key parts, variations of the tool and proper uses.

- Describe safety concerns when using basic hand tools.

Basic Tools and Materials in Construction

Basic Tools & Materials: Basic Power Tools

- Identify basic power tools and facts about each including key parts, variations of the tool and proper uses.
- Describe safety concerns when using basic power tools.

Basic Tools and Materials: Cordless Drill

- Identify different driver bits and match them to the correct fastener.
- Explain how the controls change the way the tool operates including the speed control setting, the clutch setting, forward and reverse switch, variable speed trigger.
- List the basic parts of a standard cordless drill and learn the methods of installing and removing bits and drivers.

Basic Tools and Materials: Fasteners

- Identify different fastener coating options and describe the purpose of each.
- List and describe common screw types used for building.
- List and describe common nail types used for building.

Basic Tools and Materials: Hammers

- Identify parts, types and proper use of a hammer.
- Describe safety concerns when using hammers.

Basic Tools and Materials: Hand Tools

- Identify common hand tools and facts about each including key parts, variations of the tool and proper uses.
- Describe safety concerns when using basic hand tools.

Basic Tools and Materials: Wood-based Materials

- Describe grain characteristics of wood.
- Identify common lumber defects and how to recognize each.
- Explain nominal and actual dimensions of stock lumber.
- Describe general information about sheet goods, common dimensions and their purpose related to sheathing and decking.

Build Projects

Build Project - 01 Sawhorse and Table

- Completion

Build Project - 02 Concrete Paver

- Completion

Build Project - 03 4x4 Planter

- Completion

Build Project - 04 4x8 Planter

- Completion

Build Project - 05 Park Bench

- Completion

Build Project - 06 Simple Tool Box

- Completion

Build Project - 07 Shelf Storage Tool Box

- Completion

Build Project - 08 Table Bench - Convertable

- Completion

Build Project - 09 Modern Park Bench

- Completion

Build Project - 10 Scrap Bin

- Completion

Build Project - 11 End Table (Mini Box) V2

- Completion

Build Project - 12 Mini Lumber Rack

- Completion

Build Project - 13 Lumber Rack

- Completion

Build Project - 14 Modular House Build

- Completion

Build Project - 15 High Top Table

- Completion

Build Project - 16 Shed Build

- Completion

Build Project - 17 Planter Bench

- Completion

Build Project - 18 Picnic Table

- Completion

Build Project - 19 Painting Training Station

- Completion

Build Project - 20 Old Training Booth

- Completion

Construction Basics: Measure and Mark

Measure and Mark: Chalk Line

- List the parts, features, and correct use of a chalk line.
- Use proper marking techniques with chalk lines.

Measure and Mark: Levels

- Describe the parts, features, and correct use of a level.
- Use proper techniques with levels to determine the state of both plumb and level.

Measure and Mark: Speed Square

- Identify the parts, features, and correct use of a speed square.
- Use proper measuring and marking techniques with speed squares .

Measure and Mark: Tape Measure

- Read the markings on a tape measure, including: feet and inch marks, half, quarter, eighth, sixteenth marks, layout symbols.
- Interpret the numbers, marks, and symbols on a tape measure, review different tape styles, and other special markings found on a typical tape.

DEL Safety in Construction

Fire Safety

- Prepare for, protect against, and prevent fire and features that make them operate safely and effectively.
- Describe hazards associated with construction materials and methods to prevent injury from exposure.
- Identify fire hazards, how and when fire can occur on a jobsite.
- Describe and consistently perform safe and effective methods of material handling that avoid injury to oneself and others.

General Safety

- Describe the four main categories of fatal hazards as named by OSHA and give examples of each.
- Describe common jobsite hazards that can lead to personal injury.
- Identify the various types of PPE used for hazard prevention to include head, hand, eye, foot, skin, hearing, and breathing protection.

Ladder Safety

- Perform safe setup, ascension, descension, and work while using ladders.
- Identify different types and styles of ladders and the parts and features that make them function.

Framing - Wall, Floor, Roof

Framing - Wall, Floor, Roof: 01 Air Tools

- Explain the components, functions, and maintenance requirements of air compressors, including drain valves, pressure relief valves, and oil levels.
- Select appropriate nail guns and compressors for specific applications based on gauge sizes, nail dimensions, and air capacity requirements.
- Apply proper maintenance procedures for pneumatic tools and compressors, including oiling schedules and moisture drainage.
- Describe safety features and proper operation techniques for both nail guns and air compressors.
- Compare different types of nail guns (by gauge) and air compressors (by configuration) to determine their appropriate uses and limitations.
- Identify and understand key terminology and measurements related to pneumatic systems, including PSI, CFM, and SCFM.

Framing - Wall, Floor, Roof: 02 Wall Framing Elements

- Identify the components of a framed wall and explain their functions, including plates, common studs, king studs, jack studs, and cripple studs.
- Describe the purpose and construction of rough openings for doors and windows, including headers and dimensional requirements.
- Explain standard stud layout patterns (12", 16", and 24" on center) and their relationship to sheet goods dimensions.
- Differentiate between various stud types and their roles in wall assemblies, including their alternate terminology.
- Explain the structural and fire safety functions of blocking in wall framing.
- Apply proper framing techniques to create straight walls that will properly support doors, windows, and finishing materials.

Framing - Wall, Floor, Roof: 03 Headers

- Explain the structural function of headers in wall framing, particularly their role in load distribution above openings.
- Determine appropriate header sizes and configurations based on span requirements and building codes using Table R602.7(1).
- Calculate the required number of jack studs needed to support different header configurations based on code requirements.
- Identify the various materials and construction methods used for headers, including dimensional and engineered lumber options.
- Compare different header designs and explain how they accommodate building systems such as insulation, wiring, and plumbing.
- Demonstrate understanding of how opening size affects header requirements and supporting framing components.
- Apply knowledge of header placement and installation requirements to ensure proper load-bearing support in wall assemblies.

Framing - Wall, Floor, Roof: 04 Blocking and Connections

- Explain the multiple functions of blocking in wall framing, including structural reinforcement, material attachment support, and air flow control.
- Compare different types of wall corner assemblies and evaluate their energy efficiency benefits.
- Demonstrate knowledge of proper cap plate installation at wall intersections and corners.

- Select appropriate lumber dimensions for nailers in T-wall connections between walls of different thicknesses.
- Identify various wall connection types, including ladder blocking, corner connections, and T-wall intersections.
- Describe the terminology for different wall positions in corner assemblies (through wall, butt wall).
- Evaluate the advantages and disadvantages of different blocking patterns (straight vs. staggered) and corner framing techniques.
- Apply best practices for creating strong, energy-efficient wall connections that maintain structural integrity while accommodating insulation requirements.

Framing - Wall, Floor, Roof: 05 Wall Layout

- Identify standard stud layout patterns used in wall framing (12", 16", and 24" on center) and explain their applications.
- Explain how stud layout patterns coordinate with standard sheet material dimensions to provide proper edge support.
- Describe how layout continuity is maintained across rough openings using king studs to preserve the structural pattern.
- Calculate the amount of edge support required for sheet materials in standard framing applications.

Framing - Wall, Floor, Roof: 06 Wall Sheathing

- Identify different types of structural wall sheathing materials, including OSB and plywood, and explain their applications.
- Describe the structural function of wall sheathing, particularly its role in providing shear resistance to framed walls.
- Demonstrate knowledge of proper sheathing installation techniques, including panel orientation, fastener selection, spacing requirements, and edge distances.
- Explain expansion and contraction considerations for different sheathing materials and the appropriate gapping requirements.
- Identify advanced sheathing systems such as ZIP walls and explain their benefits in moisture management.
- Interpret panel markings and exposure ratings to select appropriate sheathing for specific construction conditions.
- Apply knowledge of standard panel sizes and dimensions to optimize material usage and coordination with framing patterns.

Framing - Wall, Floor, Roof: 07 Wall Framing Exercises

- Completion

Framing - Wall, Floor, Roof: 08 Floor Framing

- Identify and explain the function of all major components in floor framing systems, including dimensional lumber joists, engineered joists (TJI), open web trusses, rim/band joists, sill plates, beams, blocking, and subflooring.
- Demonstrate knowledge of proper orientation, spacing, and layout patterns for floor framing components, including standard joist layouts and the relationship to subflooring installation.
- Apply building code requirements for floor framing, including span limitations, header specifications, and hardware requirements for various loading conditions.
- Describe proper techniques for accommodating mechanical systems within floor framing, including code-compliant drilling and notching practices for different joist types.
- Explain the structural purpose of supporting elements such as blocking, bridging, squash blocks, and ribbon boards in floor systems, including when and where they're required.
- Compare conventional and engineered floor framing systems, identifying their unique characteristics, installation requirements, and limitations.
- Apply best practices for framing floor openings, including proper header and trimmer joist configurations based on opening size and location.
- Describe the integration of floor framing with foundation systems, including sill plate installation, anchor bolt placement, and moisture control measures.

Framing - Wall, Floor, Roof: 09 Roof Framing

- Select and install appropriate roof decking materials with correct fastening methods and panel clips.
- Implement proper roof-to-wall connections using hurricane ties and other hardware to resist wind uplift forces.
- Identify and apply various roof bracing methods including diagonal bracing, blocking, and continuous lateral restraint (CLR).
- Adhere to building codes and recognize situations requiring engineering approval for modifications to roof structures.
- Properly use and select appropriate fasteners and connectors for different roof framing applications.

- Identify and differentiate between various roof styles (hip, shed, gable, gambrel, mansard) and their structural components.
- Define and calculate roof slope measurements including rise, run, and pitch ratios for proper roof design.
- Select, layout, and install appropriate rafter systems including common, jack, hip, and valley rafters with proper cuts and connections.
- Design and implement truss systems with appropriate bracing techniques, understanding the advantages of different truss types and configurations.
- Apply proper roof ventilation and moisture control techniques to prevent ice damming and control attic temperature and humidity.

Green Building: Building Science Principles

Green Building: Building Science Principles - 01 Heat Transfer

- Identify the characteristics of materials that make them better emitters of infrared radiation.
- Explain the fundamental laws of thermodynamics, particularly the first law (conservation of energy) and the second law (direction of heat flow).
- Differentiate between the three primary types of heat transfer (conduction, convection, and radiation) and identify real-world examples of each mechanism.
- Evaluate how temperature changes affect molecular activity and other properties of air.
- Apply mathematical concepts to calculate temperature differences (delta) between two measurements.
- Compare the thermal conductivity and insulation properties of common building materials.
- Describe phase changes in matter, particularly the energy requirements for vaporization of water.
- Analyze how various material properties affect heat transfer, including: R-values and their relationship to insulation effectiveness, U-values and their calculation from R-values, Emissivity ratings and their significance

Green Building: Building Science Principles - 02 Air Movement

- Define and classify air as a fluid, recognizing that fluid dynamics principles apply to air movement.
- Differentiate between the three primary airflow patterns in buildings: infiltration, exfiltration, and ventilation.
- Explain the relationship between building envelope integrity and air pressure dynamics.

- Identify the two critical factors necessary for air leakage to occur in buildings.
- Evaluate building envelope design considerations that impact air movement and pressure relationships.
- Analyze how multiple environmental factors (temperature differences, pressure differentials, and wind forces) collectively drive air movement in buildings.
- Interpret common units of measurement in building ventilation: Apply CFM (Cubic Feet per Minute) measurements to quantify airflow volume, Utilize ACH (Air Changes per Hour) to evaluate building air leakage rates
- Apply airflow principles to diagnose ventilation issues in building systems.

Green Building: Building Science Principles - 03 Moisture

- Explain the relationship between air temperature and moisture-holding capacity in building environments.
- Analyze the conditions necessary for condensation to occur, particularly the relationship between surface temperature and surrounding air.
- Interpret relative humidity measurements and explain their relationship to actual moisture content in air.
- Define and distinguish between key moisture-related phenomena: Condensation, Evaporation, Dewpoint
- Describe how changes in air temperature affect relative humidity, even when absolute moisture content remains constant.
- Identify the phase changes associated with common moisture phenomena in buildings: Liquid to gas (evaporation), Gas to liquid (condensation)
- Predict where condensation is likely to occur in building assemblies based on temperature differentials and surface characteristics.
- Apply knowledge of moisture behavior to diagnose and prevent common moisture-related building issues.

Green Building: Building Science Principles - 04 Mechanical Systems

- Differentiate between major HVAC system types and their operating principles: Heat pumps and refrigerant-based systems, Hydronic systems, Forced air furnaces, Evaporative cooling systems
- Classify venting systems for combustion appliances based on their air supply and exhaust mechanisms: Atmospheric venting, Power venting, Direct venting, Fan-assisted venting
- Explain the role and function of heat exchangers across different HVAC system types.

- Compare and contrast heating terminal units such as convectors and radiators, including their heat transfer mechanisms.
- Analyze ventilation requirements for different water heating technologies, particularly comparing gas and electric systems.
- Explain the importance of air exchange in well-sealed buildings and identify appropriate mechanical ventilation solutions.
- Interpret key HVAC efficiency metrics and terminology: AFUE (Annual Fuel Utilization Efficiency), SEER (Seasonal Energy Efficiency Ratio), HSPF (Heating Seasonal Performance Factor), RT (Refrigeration Ton), RH (Relative Humidity)
- Evaluate different HVAC systems based on their efficiency ratings and application requirements.

Green Building: Building Science Principles - 05 Thermal-Windows - Vapor

- Understand Thermal Control Layer
- Understand window science

Green Building: Building Science Principles - 06 Ventilation

- Differentiate between the three primary ventilation strategies (supply, exhaust, and balanced) and explain when each is most appropriate based on climate conditions.
- Interpret the 2021 IECC requirements for building air tightness across different climate zones (5 ACH@50Pa for zones 0-2, 3 ACH@50Pa for zones 3-8).
- Demonstrate proper blower door and duct leakage testing procedures, including correct building preparation and test pressures (50Pa for blower door, 25Pa for duct testing).
- Calculate ventilation flow rates using pressure measurements and explain the significance of CFM and ACH as key measurement units.
- Identify the appropriate code-required flow rates for different ventilation applications (bathroom exhaust fans: 50 CFM intermittent; kitchen exhaust: 50 CFM continuous).
- Analyze how different ventilation strategies impact building pressure dynamics and explain the relationship between pressure differentials and air movement.
- Evaluate how building tightness affects the need for mechanical ventilation and identify appropriate ventilation solutions for tight building envelopes.
- Explain the principle of heat recovery ventilation (HRV) systems and their classification as balanced ventilation.
- Apply ACCA Manual standards (D for ducts, J for load calculations, S for equipment selection) to ventilation system design.

- Assess the multiple "cargos" air movement transfers (heat, moisture, and pollutants) and explain how controlled ventilation manages these transfers for energy efficiency and indoor air quality.

Installing Windows

Windows: Installation

- Describe and perform the steps, tools, and materials to achieve an operable and leak proof window to include setting, securing, flashing, and sealing the unit.

Windows: Parts and Types

- Identify the main parts and features of a typical window and how they assist the window to function properly.
- Identify various window styles and explain the details of sash configuration and operation of each type.
- Identify and compare different window material types and explain how they affect window performance.

Introduction to Electrical

Electrical Materials

- Safe use of materials used in the electrical trade.
- Proper use of circuit breakers, Ground Fault Circuit Interruptors and Arc Fault Circuit Interruptors.
- Demonstrate knowledge of Romex wire gauges and color codes.

Electrical Wiring Process

- Explain the difference between a single pole switched circuit and 3 way switched circuit.
- Drill holes in framing to prepare for circuit cables to be pulled.
- Describe and demonstrate stripping Romex jacket and wire insulation to prepare for wire connections, wire splices and terminal connections
- Finish out basic electrical circuits using junction boxes, Romex cable, and standard electrical devices.
- Make proper wire connections in a standard electrical circuit
- Route Romex cable and install electrical devices per plan through wood framing.
- Properly set electrical junction boxes in new construction.

- Identify correct conductor color coding and correct matching of colors to properly wire a circuit.

Electrician's Hand Tools

- Safe use of hand tools used in the electrical trade.
- Proper use of a multimeter, a circuit tester and a proximity tester.
- Proper use of hand tools to cut, strip, and attach wires.

Electrician's Power Tools

- Safe use of power tools used in the electrical trade.
- Proper use of impact drill and a hammer drill.
- Proper use of a reciprocating saw, portable band saw and oscillating multi tool.

Introduction to Painting

Intro to Painting: Brushes

- Understand brush heads, their different configurations, bristle materials, and how various aspects of them affect performance, paint application, and finish.
- Describe and demonstrate the process of proper cleaning, handling, and storing brushes.
- Describe and demonstrate the proper way to load a brush with paint, apply the paint to a surface, and work it to an acceptable finish for a large surface area.
- Describe and demonstrate ways to apply paint to a surface and work it to an acceptable finish for a smaller and/or more detailed surface area (trim).

Intro to Painting: Caulking

- Learn the different parts and types of caulk guns and how they work to apply sealants.
- Demonstrate the proper methods to prep and use a caulk gun to apply sealants to include tooling the bead to an acceptable finish.

Intro to Painting: Materials

- Understand oil and water-based paints and the properties of different families of paints to include Latex, Alkyd, Epoxy, and Urethane.
- Understand the concept of paint sheen and how it affects the way the paint appears and performs as well as common situations where each can be used effectively.

Intro to Painting: Rollers

- Identify the 4 different parts of a roller system and the terms used to describe them.

- Identify roller cover attributes and how each affects the paint delivery and final finish.
- Choose appropriate roller components to paint a surface.
- Demonstrate the proper way to hold a roller, load a roller with paint and apply the paint to a surface.

Intro to Painting: Sanding

- Describe the purpose of sanding in the scope of the painting process.
- Identify materials for sanding and how each affects the surface finish.
- Describe the hazards related to the sanding process and choose the appropriate PPE to protect against airborne particulates.
- Demonstrate the proper methods and materials when sanding with hand and power sanding tools.

Intro to Painting: Spackling

- Demonstrate foresight to identify defects when spackling to produce a good surface for paint.
- Repair defects using the proper tools, materials, and process when spackling to produce a good surface for paint.

Intro to Painting: Taping and Masking

- Describe types and aspects of masking tapes and demonstrate methods to apply them.
- Demonstrate the setup and use of a hand masker and identify materials used with the tool for surface protection.

Introduction to Plumbing

Introduction to Plumbing: Hand Tools

- Describe parts and purpose of different hand tools used for prepping copper, PEX, PVC, ABS, CPVC pipe and fittings for assembly.
- Describe the purpose of different hand tools used for cutting and pipe and tubing to length for copper, PEX, PVC, ABS, and CPVC systems.
- Describe specialized hand tools for installing PEX water supply systems.

Introduction to Plumbing: Materials

- Understand and identify the various materials needed to prep and install copper, PEX, PVC, ABS and CPVC pipe and fittings.
- List and describe materials used to seal threaded connections.
- Size, cut, fit, and connect copper, PVC and PEX supply lines.

Introduction to Plumbing: Power Tools

- Describe the parts and the purpose of different power tools used for cutting and pipe and tubing to length for copper, PEX, PVC, ABS, and CPVC systems.
- Describe specialized power tools for installing PEX water supply systems.
- Describe parts and purpose of power tools used to modify a structure for the routing of plumbing lines.

Introduction to Plumbing: Process

- List and describe tools used to make connections with copper and brass pipe and fittings.
- List tools used to grip and tighten pipe and fittings.
- Describe types of fittings and valves and how each works in a plumbing supply line.
- Explain routing, securing, and protecting plumbing lines within a wood-framed structure.

Plan Reading for Construction

Construction Math

- Convert units back and forth from square inches to square feet and square yards.
- Add, subtract, multiply, and divide fractions and whole numbers .
- Use geometric formulas to calculate the area and volume of certain shapes to determine a material estimate.

Plan Reading Overview

- Identify notes, legends, and title blocks on a set of prints.
- Name and describe common symbols and abbreviations found on standard prints.
- Identify different dimensions and dimension lines on a set of prints.

Scaling

- Identify different print views and describe drawing features and details included in each.
- Navigate a standard set of prints to find reference information to answer questions about building details.

Safety in Construction

Safety in Construction: Fire Safety

- Identify fire hazards, how and when fire can occur on a jobsite.

- Describe hazards associated with construction materials and methods to prevent injury from exposure.
- Prepare for, protect against, and prevent fire and features that make them operate safely and effectively.
- Describe and consistently perform safe and effective methods of material handling that avoid injury to oneself and others.

Safety in Construction: General Safety

- Describe common jobsite hazards that can lead to personal injury.
- Describe the four main categories of fatal hazards as named by OSHA and give examples of each.
- Identify the various types of PPE used for hazard prevention to include head, hand, eye, foot, skin, hearing, and breathing protection.

Safety in Construction: Ladder Safety

- Perform safe setup, ascension, descension, and work while using ladders.
- Identify different types and styles of ladders and the parts and features that make them function.

Skills Projects

Skills Activities - 01 Nailing Tower

- Completion

Skills Activities - 02 Plumbing Lab

- Completion

Skills Activities - 03 Batterboard Squaring

- Completion

Skills Activities - 04 Wall Framing Exercise

- Completion

Skills Activities - 05 Wall Plumbing Exercise

- Completion

Skills Activities - 06 Wall Framing Electrical

- Completion

Skills Activities - 07 Advanced Speed Square

- Completion

Skills Activities - 08 Notch Cut Practice

- Completion

Skills Activities - 09 Leveling Tower Exercise

- Completion

Skills Activities - 10 Concrete Cube

- Completion

Skills Activities - 11 Concrete Stem Wall

- Completion

Skills Activities - 12 Material Handling

- Completion

Solar Power Installation

Solar Power Installation

- Understand Solar Careers
- Understand Introduction to Solar
- Understand Roof Framing for Solar
- Understand Solar install on Mock Roof

TPC

TPC Air Conditioning & Refrigeration Training

431 The Refrigeration Cycle

- Tell what it means to evacuate a refrigeration system and tell how it is done.
- List and describe at least three methods of leak detection.
- Explain the construction of a sling psychrometer and tell how and why it is used.
- Name the instrument used to measure relative humidity.
- Define specific humidity and relative humidity.
- Define enthalpy and explain how it is calculated.
- Demonstrate how to use the psychrometric chart to determine dewpoint temperature, specific humidity, relative humidity, and enthalpy.

- Describe a gauge manifold and tell how it is used.
- Explain the function of the refrigerant in a refrigeration system and trace its path.
- Contrast dry-expansion and flooded evaporators.
- Name the five main types of compressors.
- Define cooling medium and name the two most commonly used.
- Explain the operation of the six most common metering devices.
- State the definition of psychrometrics.
- List the four air properties important in psychrometrics.
- Differentiate between dry- and wet-bulb temperature and tell how each is measured.
- Define the term saturated air.
- Define refrigeration and air conditioning and explain how they differ.
- Describe the two methods of lowering the temperature of a material.
- Name the three physical states of matter.
- Identify what causes matter to change its state.
- Explain the difference between sensible and latent heat.
- Compare the Fahrenheit and Celsius temperature scales and convert temperatures from one to another.
- Name and describe the three methods of heat transfer.
- Define latent heat of fusion and latent heat of vaporization.
- Explain the difference between absolute pressure and gauge pressure.
- Describe the effect of pressure changes on boiling point.
- Explain the function of each of the major refrigeration system components: evaporator, compressor, condenser, and metering device.
- Define the terms subcooling and superheating.
- Name the instrument used to measure each of the following electrical values: potential difference, current, resistance, and electric power.
- List the four classes of work area hazards, and give an example of each.

432 Refrigerants and Refrigerant Oils

- Explain the ASHRAE standard for refrigeration identification.
- Calculate the compression ratio, refrigerating effect, refrigerant flow rate, heat of compression, compressor horsepower, and coefficient of performance for a system.
- Determine compressor discharge temperature, compressor volume displacement, superheat, subcooling, and total heat rejection in the condenser, using a P-H diagram.
- Explain the purpose and methods of liquid subcooling.

- Identify several properties of the ideal refrigerant.
- Use a P-H diagram to show the process of evaporation, compression, condensation, and liquid metering.
- Define the term enthalpy, and differentiate between the enthalpy of saturated liquid, the enthalpy of evaporation, and the enthalpy of saturated vapor.
- Explain the relationship between pressure and boiling point in a liquid.
- Contrast active and passive recovery equipment.
- Define the three types of refrigerant releases permitted by EPA regulations.
- List the reports you should keep concerning refrigerant purchase and use.
- Name the two broad categories of oils and the sub-categories of each.
- Explain how oil becomes mixed with the refrigerant and the problems its presence can cause in a refrigeration system.
- Describe the function of an oil separator.
- List several problems that can be caused by water in a refrigeration system.
- Describe the procedures for checking oil level and adding or removing oil.
- Discuss in detail some common refrigerants in use today—their advantages, disadvantages, characteristics, and applications.
- Define the terms blend, fractionation, temperature glide, and azeotrope.
- Describe how refrigerants are classified for safety purposes.
- Explain the safety precautions that must be taken when handling and storing refrigerants.
- Define ozone and tell why it is important.
- Explain how CFCs deplete the ozone layer and contribute to the greenhouse effect.
- Explain how refrigeration system servicing procedures have changed in response to the discovery of ozone depletion.
- Name the “three Rs” and define each term.
- Identify several ways in which good installation practices can prevent refrigerant leaks.
- Name some of the steps being taken by the United States government to control the depletion of stratospheric ozone.
- List the five main elements of the EPA regulations concerning recycling, emission reduction, and disposal.
- List the contaminants that can infiltrate or form within a refrigeration system.
- Describe the various types of filters, driers, filter-driers, and strainers used in mechanical refrigeration systems.
- Distinguish between absorption-type and adsorption-type desiccants.

- Explain the importance of proper location when installing filters, filter-driers, and strainers.
- List the important factors to consider when selecting a filter-drier.
- List several safety precautions to follow when working with filter-driers.
- Describe the various methods of locating leaks in a refrigeration system.
- Explain how to connect a gauge manifold to a system and how to remove air from the manifold.
- Explain how to check the refrigerant charge in a system.
- Name and describe the two methods of evacuating and dehydrating a refrigeration system.
- Describe the procedures for vapor charging and liquid charging a system.
- Identify and explain the various methods of adding the correct amount of refrigerant to a system.
- Contrast active and passive refrigerant recovery.
- Explain the purposes oil serves in a refrigeration system.
- Define the following properties of oil: stability, viscosity, miscibility, floc point, and flash point.
- Explain the levels of technician certification.

433 Compressors

- Describe the operating principle of a kinetic-displacement compressor.
- List advantages and disadvantages of centrifugal compressors as compared to positive displacement types.
- Describe the operation of the single-screw and twin-screw helical compressor.
- Describe the operation of a scroll compressor.
- Explain reverse hydrostatic sealing.
- Explain how centrifugal compressors deal with thrust forces.
- Trace the operation of a typical centrifugal compressor lubrication system.
- Tell the purpose of a purge system.
- Describe the capacity control methods used in centrifugal compressors.
- Explain the basic requirements of a compressor motor.
- Name the different types of single-phase and three-phase motors used to power compressors and tell which ones can be used in hermetic compressors.
- Explain how to reverse the direction of rotation of a motor.
- Explain how to change voltages on a dual-voltage motor.

- Describe the operation of the current and potential relays used for starting single-phase hermetic compressor motors.
- Name the two basic categories of motor-starting devices and tell how each operates.
- Explain the function of a reduced-voltage starter and name the five kinds used with compressor motors.
- Describe the three kinds of motor overload protection commonly used with compressor motors.
- Discuss the causes of, effects of, and solutions for high discharge pressure, low suction pressure, and low oil pressure.
- Explain the function of a suction-line accumulator.
- Explain why crankcase heaters are sometimes necessary.
- Explain how heat exchangers improve the performance of a compressor.
- State the first rule of preventive maintenance for compressors and related components.
- List preventive maintenance procedures common to most compressors.
- Explain how to calculate voltage imbalance in a three-phase motor.
- Name at least three possible causes of a low compressor oil level.
- Describe motor spot burnouts and cookouts, list their possible causes, and explain how to determine the severity of a burnout.
- Explain how to clean up a system after a motor burnout.
- Describe compressor disassembly, cleaning, inspection, and reassembly procedures.
- Name at least three possible causes of compressor overheating.
- Explain how electrical problems can cause various system malfunctions.
- Explain how to pump down a compressor for repairs.
- List important considerations in compressor replacement.
- Describe the general construction of open, semi-hermetic, and full-hermetic reciprocating compressors.
- Explain how the basic parts of a reciprocating compressor are assembled.
- Identify common designs of housings, pistons, connecting rods, crankshafts, bearings, seals, cylinder heads, and valves used in reciprocating compressors.
- Explain how a cylinder unloader controls the capacity of a reciprocating compressor.
- Explain how compressors are lubricated.
- Explain how compressor vibration and noise are controlled.
- Describe the operation of single-vane and multiple-vane rotary compressors, including how each raises refrigerant pressure.

- List several advantages of rotary compressors over reciprocating compressors.
- Define slugging and cavitation.
- Tell the two functions of an accumulator in a rotary compressor.
- Compare and contrast rotary and helical compressors.
- Contrast the operation of positive-displacement and kinetic-displacement compressors.
- Explain how each kind of the five kinds of compressor raises the pressure of the refrigerant vapor.
- List the five kinds of air conditioning and refrigeration compressors.
- Define staging and cascading and explain why each is used.

434 Evaporators and Metering Devices

- Explain the function of the evaporator in a refrigeration system.
- List five main factors affecting evaporator capacity, and explain how each can be optimized to gain the greatest possible evaporator capacity.
- Describe the basic evaporator configurations.
- Explain the function of headers and distributors in multiple-circuit evaporators.
- Explain how comfort coolers reduce both air temperature and humidity.
- Compare and contrast dry-expansion and flooded evaporators.
- List the main types of flooded evaporators.
- Explain the process of secondary refrigeration.
- Define eutectic solution and eutectic temperature.
- Describe three types of multiple-evaporator systems.
- Identify cascade and multiple-staging refrigeration systems.
- Explain how the laws of thermodynamics apply to refrigeration.
- Describe how to increase the net refrigerating effect of an evaporator.
- Demonstrate—using simple arithmetic—the amount of increase in net refrigerating effect caused by subcooling.
- List several advantages of using a heat exchanger in a refrigeration system.
- Describe three ways of keeping oil out of an evaporator.
- Explain why the circulation of air or water through an evaporator coil improves evaporator performance.
- Explain why periodic defrosting of evaporator coils is necessary.
- List and describe at least five different methods of defrosting an evaporator.
- Explain the differences between the hot-gas and reverse-cycle defrost methods.

- Explain how to clean an evaporator coil, drain pan, and drain line.
- Describe how to remove rust, scale, and sludge from shell-and-tube evaporators.
- List two ways evaporator coils can be winterized.
- Tell how low airflow and excessive moisture increase frost buildup on coil surfaces.
- Explain how dirty coils and damaged fins reduce an evaporator's cooling capacity.
- Explain the primary function of a metering device.
- Name the five main types of expansion valve, and describe the operation of each.
- Contrast the operation of an internally equalized and an externally equalized TXV.
- Explain how to adjust the superheat on a TXV.
- Describe the structure, operation, and application of high- and low-side float valves.
- Identify three causes of floodback and describe the corrective action for each.
- List the common problems of TXVs along with their solutions.

435 Condensers and Cooling Towers

- Contrast the two types of air-cooled condensers—natural draft and forced air.
- Describe the construction of an air-cooled condenser, including the tubes, fins, headers, and subcooling circuit.
- Name the factors that affect condenser capacity.
- Explain the effects of ambient temperature on the capacity of an air-cooled condenser.
- Describe various types of low-ambient controls for air-cooled condensers.
- Explain how spring-loaded pressure-relief valves and fusible plugs protect against possible explosions caused by high pressure.
- List the periodic maintenance procedures common to most air-cooled condensers.
- Name and describe the basic types of water systems used by water-cooled condensers.
- Define the terms makeup water and fouling factor.
- Describe the construction of the various kinds of water-cooled condensers.
- Explain the purpose of the accessories used with water-cooled condensers—pressure relief devices, water-regulating valves, and strainers.
- Explain water-cooled condenser maintenance procedures, including inspection for leaks and chemical and mechanical cleaning.
- Explain the function of cooling towers and spray ponds and the factors that affect their capacities.
- Identify the basic types and construction of cooling towers and spray ponds.

- Describe the components required in a cooling-tower or spray-pondwater-circulating system and explain the purpose of each.
- Describe the various devices used to control cooling-tower capacity.
- Explain cooling-tower and spray-pond maintenance procedures.
- Identify the basic types of evaporative condensers.
- Describe the components that make up the three circulation systems in an evaporative condenser—refrigerant, air, and water—and explain the operation of each.
- List the kinds of capacity controls used on evaporative condensers and explain the operation of each.
- Explain how to provide freeze protection for an evaporative condenser.
- Outline evaporative-condenser maintenance procedures.
- Describe the three categories of water problems encountered in the water systems of water-cooled equipment.
- Name the five causes of corrosion and explain how to control them.
- Describe the three most common types of scale, their causes, and how to control them.
- List the three types of organisms that grow in water systems and explain how to control them.
- Describe the three types of wood deterioration and explain how to control them.
- Explain the operation of three chemical-feeding devices used in water systems.

436 Piping

- Explain the importance of thermal insulation for refrigeration system piping.
- Define corrosion and explain how it can be prevented in refrigerant and water piping.
- Name three methods of joining steel pipe.
- Explain how tubing is cut, flared, bent, and joined.
- Describe the step-by-step procedure for making a brazed joint.
- Name the three main lines of piping in a refrigeration system.
- Explain why air conditioning and refrigeration piping must be sized correctly.
- Contrast pipe and tubing and explain why tubing is often preferred over piping.
- Explain how pipe is classified according to schedule.
- Explain how a double suction riser moves oil along with the refrigerant.
- Explain why suction lines are pitched down toward the compressor.
- Explain the function of an accumulator and a heat exchanger in a suction line.

- Describe the basic differences between evaporator-pressure regulators and crankcase pressure regulators.
- Describe the various ways of supporting horizontal and vertical pipe runs.
- Describe the damage that can be caused by vibration and tell how to protect piping from it.
- Explain why it is necessary to insulate the suction line.
- Explain how a suction line for multiple compressors differs from a suction line for a single compressor.
- Name at least four factors that cause piping problems and can lead to operating problems.
- Explain why cleanliness is essential when assembling refrigeration piping.
- Name at least three ways to allow for the expansion of piping.
- Name and explain the purposes of three discharge-line accessories.
- Name the functions of the liquidline.
- Explain why it is desirable to have subcooling in the liquid line.
- Describe the effects of pressure drop in the liquid line on the operation of a refrigerant system.
- Describe the effects of flash gas formation on the performance of the system.
- State the flow velocity needed for refrigerant vapor to entrain oil in horizontal piping and in vertical risers.
- Name some practical steps you can take to assure a good flow of refrigerant in horizontal piping.
- List the four functions of the discharge line in a refrigeration piping system.
- Explain the importance of pressure drop in piping and its effects on system operation.
- Define the term entrainment and explain why entrainment of oil is important.
- Describe the functions of the suction line, its structural demands, and special design features.
- Describe ways of preventing refrigerant and oil migration to the compressor.
- Explain the purpose of a liquid receiver.
- Explain why each of the following devices is used in the liquid line: sight glass, solenoid valve, check valve.

437 Control Systems

- Explain why control systems are needed and name devices used to control environmental conditions.

- Define the terms used to describe control systems—controlled variable, controller, controlled device, setpoint, control point, and controlled medium—and name the basic elements of a control system.
- Describe the action of two-position, floating, and proportional control.
- Explain how anticipators work.
- Compare open-loop and closed-loop control.
- Compare the basic requirements of pneumatic/hydraulic control systems to those of electric/electronic control systems.
- Explain the need for a sensor in a control system.
- Name and explain the operation of three kinds of temperature sensors.
- Define relative humidity, state the range required for human comfort, and describe common humidity sensors.
- Name three common pressure sensors and explain their operation.
- Explain the operation of two-position dampers and valves in shutoff and throttling applications.
- List the advantages of variable-speed drives over older methods of speed control.
- Describe the operation of two-position, floating, and proportional electric controllers.
- List the equipment needed for a pneumatic control system.
- Name several pneumatic relays and switches, and explain why each is used.
- Discuss the advantages and basic operation of electronic controls.
- Define resolution, sensitivity, proportional band, and gain, and explain how they are related.
- Distinguish between integral and derivative action, and explain how each can improve system performance.
- Explain how pump down control operates and why pump down is often preferred over other methods of primary control.
- Describe the location, function, and operation of a high-pressure control.
- Name three ways to control condenser pressure and at least three ways to control system capacity.
- Explain how a differential oil pressure safety control works.
- Compare the two methods of modulating the flow of water to hydronic terminals.
- List the four basic steps involved in setting up a PM program.
- Explain the importance of high-pressure controls as safety devices and explain their testing procedures.
- Explain how oil pressure is maintained in various kinds of compressors.

- Describe the testing and maintenance required for condenser water regulating valves and compressor capacity controls.
- Explain how to check for oil and water contamination in control air and what measures to take to minimize them.
- Explain the major maintenance requirements of a pneumatic control system.
- Describe the maintenance required by electric and electronic controllers.
- Explain how to use a troubleshooting chart.

438 Air Handling Systems

- Explain the operation of electronic air cleaners and tell how they are serviced.
- Explain the function of an air filter.
- Describe the two main types of mechanical air filters.
- Explain how to establish a service schedule for air filters.
- Describe a pitot-tube traverse.
- Describe the instruments used to test and balance an air-handling system.
- Explain why air-handling systems need to be balanced.
- Explain how to clean and/or replace the filters in your HVAC system.
- Name common complaints related to air-handling systems and give common causes.
- Discuss the characteristics of sick building syndrome (SBS).
- Describe the process for investigating an SBS complaint and explain how to conduct a facility site review.
- Discuss ways a facility can minimize the probability of perceived SBS problems.
- Discuss internal and external SBS contributors, including HVAC systems, and discuss ways to eliminate or reduce the problems.
- Describe specific ways to control particulates, odors, and other contaminants.
- Define the abbreviations SBS, IAQ, BRI, VOC, and MCS.
- List the variables controlled by an air-handling system.
- Define comfort and explain how to predict whether or not people in a space will be comfortable.
- Define the following terms: laminar flow, turbulent flow, streamlining, and eddy currents.
- Differentiate between static pressure, velocity pressure, and total pressure in an air distribution system.
- Compare a dual-duct system to a single-duct system in both structure and operation.
- Describe the two basic types of fans used in air-conditioning systems.

- Define the terms system characteristic and point of operation.
- Explain why a knowledge of fan laws and performance curves is necessary when altering an air-handling system.
- Describe preventive-maintenance procedures for typical fans.
- Explain how to replace the bearings in a centrifugal fan.
- Define the term aspect ratio.
- Compare and contrast a radial duct system and an extended plenum system.
- Describe the structure and purpose of dampers and turning vanes.
- Identify a variety of fittings and connections used in a sheet metal ductwork system.
- Explain how and why ducts are insulated and reinforced.
- Identify common types of sheet metal seams and describe how each is fashioned.
- Explain the basic servicing and inspection procedures for ductwork systems.
- Demonstrate how to measure velocity pressure and show how airflow rates are calculated from these pressure readings.
- Explain in step-by-step fashion how to test and balance an air-handling system.

439 System Troubleshooting

- Tell what knowledge is essential for an effective troubleshooter to have.
- Tell what safety precautions must be followed when dealing with the mechanical, electrical, chemical, and environmental hazards involved in troubleshooting.
- List the necessary tools, equipment, and supplies needed to perform troubleshooting procedures.
- Give an example of each of the following applications: process refrigeration, commercial refrigeration, process air conditioning, comfort air conditioning.
- Explain why human relations skills are important to the refrigeration system troubleshooter.
- Name the six basic steps in the troubleshooting procedure.
- Explain why it is important to collect information from the equipment operator when a system is malfunctioning.
- Explain what type of information is contained on a nameplate and in the operations log of a system.
- Explain the structure and use of troubleshooting charts.
- Explain how to set up a preliminary checklist and how to select the most likely components and subsystems for further examination.
- List items to check out after making repairs to a refrigeration system.

- Explain how to use a troubleshooting chart.
- Explain how to isolate a control circuit failure from a motor circuit failure.
- List the causes of abnormally high control circuit resistance.
- Explain the difference between using an ohmmeter and using a voltmeter to check for a closed electric switch.
- Describe how to check contactor coils and motors for shorts and opens.
- Describe the symptoms of control air contamination and explain how to remedy it.
- Explain how to check thermostat output pressure.
- List at least three kinds of actuator problems and explain how to solve them.
- Describe the calibration procedure and explain its purpose.
- Explain how to calibrate a pneumatic controller.
- Distinguish between a refrigerant circuit problem and a conditioned-medium problem.
- Explain the procedure for checking refrigerant charge.
- Name major causes of variance in head and suction pressures.
- Explain how to isolate the cause of compressor short cycling.
- Explain how to use head-pressure readings and suction-pressure readings in diagnosing refrigeration problems.

440 Absorption Chillers

- Explain the differences between a mechanical refrigeration system and an absorption system.
- Describe the basic components in a simple absorption system and their functions in the refrigeration cycle.
- Distinguish between the characteristics of a weak solution and a strong solution and explain the function of each in the absorption cycle.
- Define the terminology associated with absorption systems.
- Describe the steps in a simple single-effect absorption cooling cycle.
- Discuss basic characteristics of water/lithium bromide absorption systems and name common industrial uses.
- Describe the differences between single-effect and double-effect absorption systems.
- Discuss the action of the solution and the refrigerant throughout a solution cycle within absorption systems used for heating only, cooling only, and simultaneous heating and cooling.
- Compare reverse, series, and parallel solution flow cycles.

- Discuss operating characteristics of various absorption machines and explain how the coefficient of performance (COP) is used in equipment selection.
- Describe the cause of crystallization and its effect on an absorption system.
- Discuss the general operating limits of absorption units, including ASHRAE 15 machine room safety requirements.
- Describe the basics and benefits of today's microprocessor-based operation and capacity control.
- Describe the normal absorption unit start, run, and shutdown sequences.
- Name various kinds of system operating controls and safety controls and explain their functions.
- Describe general setup and maintenance requirements and the procedures that keep the absorption chiller operating efficiently.
- Discuss the necessity for insulation and control of noncondensable gases, including air.
- Discuss the solubility of ammonia in water and other characteristics, including hazards, that affect ammonia absorption systems.
- Describe important characteristics of both single-effect and double-effect water/lithium bromide absorption chillers and ammonia/water absorption units.
- Briefly describe the operation and characteristics of centrifugal chillers.
- Briefly describe the operation and characteristics of reciprocating and screw positive displacement chillers.
- Name factors that must be considered in selecting air-conditioning equipment for specific applications and compare COPs for the various kinds of equipment.
- Discuss general cost criteria for the various types of energy used to drive the equipment and describe an appropriate absorption system application.
- Explain the function of the analyzer and rectifier in an ammonia absorption system.
- Explain the operation of the Platen-Munters ammonia/water/hydrogen system.
- Define the terms strong aqua and weak aqua as related to the ammonia water solution and compare them with the terms strong solution and weak solution as related to a lithium bromide system.
- Describe typical applications for industrial ammonia absorption systems and small residential and commercial ammonia absorption systems.
- Name reasons why ammonia absorption systems are likely to be used increasingly in the future.

- Discuss reasons for continuing testing and development of advanced absorption systems.
- Describe current developments in the GAX ammonia/water residential heat pump systems.
- Describe triple-effect systems and compare absorption and adsorption cycles.
- Explain how special-application absorption systems use recovered heat, waste heat, or a solar array to provide the energy for operation.
- Describe the properties of non-standard solution pairs.
- Explain how two kinds of hybrid arrangements incorporate the absorption system.

441 - Heat Pumps

- Explain how a heat pump differs from standard air-conditioning equipment.
- List the benefits of heat pump systems.
- Describe the heating, cooling, and defrost heat pump cycles.
- Define degree-day.
- List considerations in sizing heat pumps.
- Compare the operation of water-to-water and water-to-air heat pump systems.
- Compare the operation of ground-to-air and air-to-air heat pump systems.
- Describe the operation of solar-assisted heat pump systems.
- Describe the operation of geothermal heat pump systems.
- Describe the operation of dual-fuel heat pump systems.
- Discuss the differences in configuration and installation of split and packaged heat pump units.
- Determine heat pump system balance points and explain their relationship to system capacity.
- Discuss the use and control of supplemental heat.
- Discuss ARI single-point and seasonal heating and cooling ratings for heat pump equipment.
- Explain how several common variables affect heat pump operating costs.
- Describe how to use the heating degree-day, cooling degree-day, and bin methods of estimating heat pump system energy use.
- Describe common problems of heat pump systems in the heating mode.
- Explain why heat pump systems include an accumulator.
- Describe the indoor and outdoor coils, indoor air handling components, and various metering (flow-control) devices.

- Briefly discuss the requirements of reciprocating and scroll compressor operation as used in heat pump systems.
- Discuss the use and operation of the reversing valve and check valves in heat pump systems.
- Explain the functions of the equalizer tank, heat exchanger, and filter-driers in heat pump systems.
- Briefly describe indoor and outdoor controls and popular defrost control systems.
- Describe the operation of the pressure differential and temperature differential defrost methods.
- Compare the advantages and disadvantages of the timed defrost and time-and-temperature defrost methods.
- Compare the construction and operation of electromechanical and solid-state defrost controls.
- Explain the functions of pressure controls, heat sequencers, and the emergency heat relay in heat pump systems.
- Describe typical starting and lockout devices used on heat pumps and explain why systems include transformers, contactors, and overload protectors.
- Discuss considerations in selecting the best location for outdoor unit installation.
- Discuss considerations in selecting the best location for indoor unit installation.
- Describe installation practices that help the air distribution system fulfill its purpose.
- Discuss procedures for installing refrigerant lines and primary and auxiliary drain lines.
- Discuss the requirements for installing electrical wiring.
- Describe additional requirements for installing a packaged heat pump unit.
- Describe basic checkout procedures for the compressor crankcase heater, air distribution system, and all heat pump mountings.
- Describe basic steps in leak testing and charging a heat pump unit and discuss basic requirements for post-installation checkout of heat pump insulation and piping.
- Describe both the general post-installation checkout of the electrical system and tests to check specific electrical connections.
- Explain how to check the operation of the system thermostat, outdoor thermostats, and defrost controls.
- Name ways to increase blower output and explain why operator instructions are important.

464 Purging, Piping, and Safety

- Explain the reasoning behind the dual hazard assessment requirements of a worst-case ammonia release and the more practical alternative ammonia release.
- Explain how to select the proper suction line, discharge line, and liquid line sizing for an ammonia system.
- Discuss special piping situations that require alternative sizing or installation.
- Describe the basic differences between ASHRAE and ASME codes and IIAR standards and guidelines.
- Discuss several main points in the ASHRAE 15-1994 safety code for mechanical refrigeration.
- Describe code requirements based on the occupancy classifications, leak probability classifications, and refrigerant characteristic classifications.
- Describe several requirements in the ASME B 31.5 refrigeration piping code concerning the materials and fabrication of refrigeration piping systems.
- Name several safety requirements specified by IIAR 2 for ammonia refrigeration equipment.
- Describe the kinds of information provided by IIAR bulletins.
- Discuss the purposes of Process Safety Management and describe the thirteen elements that make up PSM.
- Describe the process for estimating a plant's ammonia inventory and establishing a plant ammonia library and explain why each is needed.
- Discuss the personnel and steps involved in developing a PSM plan for a specific refrigeration plant.
- Describe the process hazard analysis (PHA) and explain how it can reduce the likelihood of ammonia accidents and spills.
- Describe the requirements for preparing standard operating procedures (SOPs) for all normal plant service, repair, and maintenance.
- Discuss contractor responsibilities for PSM.
- Discuss the importance of management-of-change procedures in keeping paperwork up-to-date.
- Describe the purposes of the EPA Risk Management Plan and compare it to the OSHA Process Safety Management program.
- Discuss the hazards of working with ammonia and the importance of using personal protective equipment to avoid or minimize the effects of an ammonia release.

- Discuss the importance and difficulties of presenting the required release data and plan to the community.
- Discuss the toxic end point criteria for an ammonia release and distinguish between rural and urban end points and differences in requirements.
- Describe correct first aid procedures pertaining to contact with ammonia vapor and liquid.
- List common noncondensable vapors and discuss their effects in a refrigeration system.
- Discuss the power penalty resulting from noncondensable gases in terms of compression and loss of refrigeration capacity
- Explain how to determine the presence of noncondensables.
- Explain how to minimize the entrance of noncondensables and describe common entry points.
- Compare the features and operation of manual and automatic purging equipment and name the best connection points for the purge unit.
- Discuss the economic benefits of the purge unit in terms of typical payback times.
- Discuss the relationship between pressure drop requirements and pipe sizing.
- Discuss the factors that affect the pressure drop in a pipe.
- Explain the significance of the Reynolds number and the distinction between laminar and turbulent flow.
- Discuss the use of various kinds of line sizing charts including flow rate tables, equivalence tables for fittings and valves, and pressure drop charts.

TPC Ammonia Refrigeration

461 Ammonia Refrigeration Basics

- Name common uses of ammonia and describe benefits of ammonia refrigerant in terms of ozone depletion and global warming potentials (ODP and GWP).
- Describe the properties of ammonia and explain how they affect the use of ammonia as a refrigerant.
- Discuss the toxicity and flammability of ammonia and its classification as a hazardous material.
- Discuss important features of ammonia saturation curves, reactions with metals, and MSDS criteria.

- Name two standards governing ammonia refrigeration systems and describe the four main ammonia safety concerns, steps for their prevention, and first aid treatment in the event of exposure.
- Briefly compare absorption and mechanical compression systems, compare dynamic and positive-displacement compressors, and name those generally used in industrial ammonia refrigeration systems.
- Explain how a positive-displacement compressor increases the ammonia vapor pressure.
- Define British thermal unit (Btu), specific heat, sensible heat, latent heat, and tons of refrigeration.
- Name four primary components in single-stage ammonia refrigeration systems and describe their functions.
- Describe the functions of the oil separator, high-pressure liquid receiver, king valve, and suction accumulator in single-stage ammonia refrigeration systems.
- Define superheat, enthalpy, and entropy and explain how they are used on the pressureenthalpy (P-H) diagram
- Define compression ratio and explain its importance in single-stage and two-stage industrial ammonia refrigeration systems.
- Explain why flash gas removal, booster discharge-vapor desuperheating, and interstage liquid cooling are desirable in the two-stage system.
- Plot a two-stage refrigeration system on an ammonia pressure-enthalpy (P-H) diagram.
- Name the primary and secondary components of a two-stage refrigeration system and describe component functions.
- Explain why a two-stage system requires less overall power than a single-stage system.
- Explain why suction accumulators are needed and describe the damage that can result from liquid entering the compressor.
- Discuss the purposes and reasoning behind the design features, including the boil-out coil, of suction accumulators.
- Describe the various ammonia refrigerant liquid/vapor separation criteria.
- Explain how the intercooler deals with flash gas and desuperheats the booster discharge.
- Describe basic differences between a flash intercooler and a shell-and-coil intercooler.
- Describe typical configurations for alternate intercoolers provided with internally compounded compressors.
- Describe the various functions performed within the recirculation vessel.

- Discuss the advantages and disadvantages of recirculation systems.
- Describe design features of horizontal and vertical recirculation vessels.
- Discuss the surge-volume requirements of a recirculation system and reasons for high-level alarm/cutout controls on the recirculation vessel.
- Describe the features and drawbacks of various kinds of liquid- refrigerant pumps.
- Describe the operation of pumper drum (gas-pressure) recirculation systems and controlled pressure receiver (CPR) recirculation systems.

462 Positive Displacement Compressors

- Discuss lubrication management in screw compressor systems.
- Describe the approved method for removing oil from the system low-side oil pots.
- Name lubricants recommended for use with ammonia systems and explain the importance of using only specified lubrication products.
- Briefly describe the evolution of ammonia reciprocating compressors.
- Describe typical design features of today's reciprocating compressors.
- Explain how capacity control and proper lubrication are achieved in ammonia reciprocating compressors.
- Explain how to use volumetric and adiabatic efficiency data and the performance factor in sizing or selecting compressors for an application.
- Describe the function and basic design requirements of internally compounded reciprocating compressors.
- Describe the basic operation of sliding-vane rotary booster compressors.
- Explain the principle of fixed volume ratio compressors.
- Describe typical rotary compressor design features.
- Explain why sliding-vane rotary compressors have been replaced by screw compressors.
- Discuss the reasons for rotary vane compressor speed limitations and the causes and effects of blade wear.
- Describe how capacity control is achieved in rotary compressors.
- Discuss the developments that led to the use and acceptance of the oil-flooded screw compressor in industrial refrigeration.
- Describe typical design features of single-screw and twin helical screw compressors.
- Explain how the compression system works within screw compressors.
- Compare fixed and variable volume machines and their applications.
- Explain how the capacity-control slide valve and variable V_i slide stop function.

- Describe the general range of application for screw compressors.
- Explain why screw compressors are provided as units and describe the main systems that make up the screw compressor unit.
- Explain why a vertical or horizontal oil separator may be preferred and explain why check valves are used on the unit inlet and outlet connections.
- Discuss drive methods and oil distribution methods used on screw compressors and describe tasks provided by the lubricant within the compressor.
- Explain how the refrigerant vapor/oil separation system operates and list the methods and benefits of oil cooling in screw compressor units.
- Discuss the beneficial uses of the side port and the operation of the screw compressor capacity reduction slide valve control system.
- Name the codes and other criteria with which ammonia refrigeration systems must comply to establish and maintain a safe work environment.
- Discuss the purposes of lubricants in ammonia systems.
- Define the terms used to describe and specify lubricants and oils and discuss the importance of the miscibility and viscosity relationships between lubricants and ammonia.
- Describe the proper methods for handling lubricants.

463 Evaporators, Conditioners, and Controls

- Discuss the benefits of the newer electronic level controllers in the automatic control of liquid levels, safety alarms, and system shutdown procedures.
- Describe the operation and functions of the hand expansion valve and describe typical pressure regulating valve applications and methods by which the valve is controlled.
- Explain how the soft hot gas defrost system protects large industrial coils.
- Describe preset timer defrost methods.
- Describe the basic differences between air-cooled, water-cooled, and evaporative condensers and discuss the main operating features of each.
- Describe common defrost methods that do not use hot gas—electric, water, continuous glycol spray, and room air.
- Discuss system high-side and low-side float valve uses and describe the operation of mechanical float switches.
- Discuss the benefits of the evaporative condenser and explain why it has the lowest condensing temperature.
- Describe the design components of an evaporative condenser and explain how they work together to provide cooling.

- Discuss both the process of condenser selection and good and bad practices in locating condensers.
- Describe proper piping and equalization practices for both single and multiple condenser installations.
- Explain the need for condenser winterization and capacity control and discuss proper water treatment to control mineral and bacterial content.
- Discuss the relief valve safety requirements as specified by the ASHRAE 15 code.
- Explain why dual relief valves are used, describe proper positioning of the three-way diverting valve, and explain how to calculate relief valve flow capacity.
- Describe the functioning of the various stop valves used on ammonia systems and explain why angle valves are preferred.
- Describe the various kinds of check valves and solenoid valve uses in automatic control on ammonia refrigeration systems.
- Explain why ice and frost form on a coil and discuss the problems resulting from this formation.
- Describe the basic process of defrosting by means of hot gas from the compressor discharge.
- Discuss the construction and operation of evaporators used as air coils (coolers), including the benefits of penthouse installation.
- Describe the operation of various common kinds of freezers and ice makers.
- Explain how subcoolers, intercoolers, and thermosiphon oil coolers function as evaporators.
- Describe common DX and flooded liquid chiller arrangements
- Discuss the reasons for coil fins and enhanced tube designs.
- Describe how a dump trap functions and how it differs from a pumped overfeed system.
- List basic principles affecting evaporator heat transfer ability in DX and liquid overfeed systems.
- Explain how a thermostatic expansion valve works and why a DX coil must have more heat transfer surface than an overfeed coil.
- Describe the liquid feed and operation of flooded ammonia shell-and-tube fluid coolers.
- Discuss basic details of evaporator operation, including the use of secondary coolant.
- Discuss the operation of a CPR system.
- List the benefits of a machine room liquid recirculation unit and benefits compared to direct expansion systems.

- Explain how refrigerant flows in a thermosiphon system and describe the requirements for a surge drum in a gravity feed system.
- Describe the various level controls used in a recirculation unit and explain how the liquid refrigerant is pumped from the recirculation unit through the evaporator coils.

TPC Building & Grounds Maintenance

318 Industrial Rigging Principles and Practices

- Enumerate the signs of damage that would probably cause a wire rope to be removed from service.
- Identify the different grades of chain and name some of their applications.
- Identify the tools used in rigging and explain the purpose of each.
- Give examples of three methods of calculating the weight of a load.
- Explain center of gravity and its importance in rigging a load.
- Describe four common sling arrangements and the relation between sling angle and horizontal force.
- Name five types of hooks frequently used in rigging and explain the purpose of each.
- Discuss proper hook use and cite four reasons for removing a hook from service.
- Identify the component parts of wire rope and describe its construction and classification.
- Identify and discuss the factors that affect wire rope strength.
- Describe the basic single-leg and multiple-leg slings and the calculation of their allowable loads.
- Define the terms working load limit, proof test, and minimum breaking force.
- List and discuss four factors that affect the strength of chain slings.
- Describe three types of damage you might see in a daily inspection of chain slings that would lead you to set the sling aside for more thorough examination.
- Describe the two standard types of end fittings for metal mesh slings and the hitches for which each can be used.
- Name several advantages of, and applications for, metal mesh slings.
- List the visible signs of damage that would cause you to recommend a sling's removal from service.
- Identify the grades of manila rope that can be used for overhead lifting.
- Name the three commonly used synthetic-fiber ropes and list three of their advantages over manila.
- Discuss the factors that affect the strength of fiber rope.

- Name the signs of wear or damage that would warrant setting a fiber-rope sling aside for more detailed inspection.
- Describe an encased polyester fiber sling.
- Explain the construction of synthetic-web slings and name four of the basic types.
- List examples of visible damage that should cause a synthetic-web sling to be removed from service.
- Describe the characteristics of the various kinds of overhead hoists.
- Explain the differences between single and double reeving.
- Explain the proper function and operation of an upper limit switch and an overload limit device.
- Describe and contrast the construction of top-running and underhung cranes.
- Identify the three basic types of jib cranes.
- Describe what the rigger's daily visual inspection should include.
- List examples, from the additional criteria given in this lesson, of conditions that should warrant removal of wire rope or hoist load chain from service.
- Enumerate the general operating practices that apply to all tools of rigging.
- Explain the 11 operating practices that apply to slings.
- Discuss nine operating practices that should be observed when using a hoist or crane.
- Detail the special circumstances under which a hoist or crane may be used to pull a load or lift a load heavier than the equipment's rated capacity.
- Describe three methods of turning a load.
- Discuss the eight questions that a rigger must answer in the thought process that should precede any lift.
- Explain the construction of pole and suspension scaffolds and lift platforms, and the safety measures that apply to them.
- Name several scaffolding accessories and explain their use.
- Discuss recommended usage and inspection of the three common types of ladders.

361 Introduction to Carpentry

- Identify the safety equipment that a carpenter should wear to protect his eyes, hands, and feet.
- List the twelve common layout tools mentioned in this lesson.
- Describe how to check the accuracy of a framing square.
- Tell how you would acquire the hand tools you need as a carpenter trainee.
- Point out the features that you'd look for when buying your own toolbox.

- List the twelve safety rules for power tools mentioned in this lesson.
- Explain how to mount a new blade properly in a circular saw.
- Tell how to start and finish a cut with a circular saw.
- Describe how to drill wood safely with a power drill.
- Tell how to shape an edge with a router.
- Identify the three steps involved in sanding a surface with a finishing sander.
- Describe the difference between the actual and nominal dimensions of lumber.
- Tell how defects such as checks, knots, and warping limit the value and use of lumber.
- Explain how kiln drying of lumber produces different results from air drying.
- Point out the differences between solid core and veneer core plywood.
- Describe the construction and uses of particleboard.
- Compare common nails, casing nails, and finishing nails.
- List the information you must give your supplier when ordering wood screws.
- Explain the difference between a board foot and a linear foot of lumber.
- Describe the relationship between a bundle and a square of roofing shingles.
- List the information contained in a bill of material.
- Name the factors you need to prepare a cost estimate for labor on a job.
- Point out some of the things you must do before beginning a job, so the work goes smoothly.
- Name the features of a building that you will find in the plan and elevation views.
- Demonstrate how to use an architect's scale and a draftsman's scale.
- List at least four building features whose details are contained in the specifications.
- Explain why building codes are necessary in the construction industry.
- Describe the information you must submit to obtain a building permit.

362 Constructing the Building Shell

- Demonstrate how to lay out a right angle without using instruments.
- Explain how to set up batterboards and building lines for an excavation.
- Tell what you can do to assure your own safety when working around an excavation.
- Describe how to erect a form for a concrete footing.
- Show how to mix a small batch of concrete using the "bottomless box."
- Describe how to prevent concrete slabs from cracking.
- Demonstrate how to lay out anchor bolt holes in sills.
- Describe the two methods of framing a cantilever.
- Compare cross bridging and solid bridging between floor joists.

- Explain how to construct and erect an inner stud wall.
- Tell why carpenters prefer to use plywood for sheathing walls.
- Point out how the heel, plumb, and seat cuts in a rafter are different.
- Identify the information printed on the face and back of a framing square.
- Explain how to use a framing square to determine the line length of a rafter.
- Describe how to lay out studs for a gable end.
- Tell how to determine the length of hip rafters.
- Explain how awning-type and hopper-type casement windows differ in operation.
- Name three or four of the common glazings and tell the advantages of each.
- List the critical dimensions for preparing and installing window units.
- Describe how to install a window unit.
- Tell how to mount a fixed glass in a picture window.
- Explain how to install mortise hinges on a door, and hang the door in the jamb.
- Explain how a built-up roof is constructed.
- Give some of the safety precautions to follow when working with hot tar.
- Describe how to apply asphalt shingles to a roof.
- Tell how to estimate the amount of roofing required for a building.
- Describe how to use a story pole in the application of wood siding to a building.
- Explain how to install cornerboards for exterior trimming.

363 Finishing the Building Interior

- Give the uses of cove, crown, and half-round moldings.
- Describe how to make a scarf joint and coped joint.
- Demonstrate how to cut a 45° miter with a miter box.
- Tell how to install the casing around a door opening
- Explain how to construct the interior casing for a window.
- Explain how to fasten single-ply plasterboard panels to the stud framing for interior walls.
- Describe the three-step procedure for cementing and taping drywall construction.
- Name the advantages of a drywall system that uses metal studs.
- Explain how to install interior plywood paneling.
- Differentiate between the three coats of plaster required for plaster wall construction.
- Identify the main parts of the framing system for suspended tile ceilings.
- Tell the differences between strip, block, and plank flooring.

- Explain how to lay flooring strips, keep them straight, and make adjustments when they are not straight.
- Tell how to plan and make a careful layout for installing a wood block floor.
- Give the sequence of sanding operations for a newly installed wood strip floor.
- Name the materials you can use for underlaying a resilient or ceramic floor.
- Explain how to lay a tile floor with the tile veneer method.
- Describe some of the common stairway configurations: open, closed, L-shaped, U-shaped, etc.
- Starting with the stringers, name all the parts in a stair assembly.
- Explain how to use a story pole to check stair calculations.
- Tell how to anchor a flight of stairs.
- Name the guidelines for constructing handrails or railings in stairways.
- Explain how hollow-core, fiber-core and solid-core doors differ in construction.
- Tell how to remove a door hung on hinges with fixed pins. Also with loose pins.
- Give the guidelines for placing three hinges on the edges of a door.
- Describe how to install a single-swing door.
- Differentiate between pocket-type and bypass-type sliding doors.
- Name a few of the types of locks used on interior doors.
- Differentiate between a base shoe molding and a baseboard molding.

364 Structural Painting

- Discuss environmental factors that influence paint choices.
- Describe the different types of paint brushes.
- Explain the uses of different roller constructions and different lengths of roller nap.
- Discuss the various types of spray equipment.
- Compare the different types of blasting equipment and the abrasives used with them.
- Explain how film gauges, holiday detectors, and surface profile devices work.
- Discuss the importance of correct surface preparation and compare SSPC and NACE standards.
- Compare the various methods of chemical cleaning.
- Name the hand tools and power tools used for cleaning.
- Explain the three basic reasons for using paint.
- Identify the ingredients of paint and explain the importance of each.
- Name several generic paint types and describe their uses in normal industrial applications.

- Compare the characteristics of ferrous and non-ferrous metals, concrete, and wood as substrates.
- Discuss environmental factors that influence paint choices.
- Explain the three basic reasons for using paint.
- Identify the ingredients of paint and explain the importance of each.
- Name several generic paint types and describe their uses in normal industrial applications.
- Compare the characteristics of ferrous and non-ferrous metals, concrete, and wood substrates.
- Point out safety measures necessary when using cable-supported or suspended units.
- Discuss stationary scaffolding and accessories.
- Explain the characteristics and applications of the different grades of abrasive blasting.
- Describe surface preparation techniques for concrete, galvanized metal, wood, mildewed surfaces, and chain-link fencing.
- Describe correct mixing and thinning methods.
- Point out the dos and don'ts of brush and roller usage.
- Explain how to use and troubleshoot spray equipment correctly and how to set up blasting equipment.
- Discuss the causes of common coating failures and explain how to prevent them.
- Calculate estimated coverage and keep satisfactory records.
- Explain the importance of attitude, in preventing injury, and how heat, cold, wind, and heights can be dangerous.
- Compare different types of ladders and tell how to use them safely.
- Compare bosun's chairs, work cages, and swinging scaffolds and platforms.
- Describe boom and scissors lifts and tell how to use them safely
- Explain how painting materials cause fire or explosions and tell how to reduce these hazards.
- Define six categories of health hazards and name ways to avoid them.
- Give examples of toxic and dermatitic painting materials and explain the purpose of threshold limit values.
- Compare types of respirators and their uses, and list the rules for working safely in confined spaces.
- Describe appropriate uses for safety clothing and tell how to use an MSDS.

366 Flat Roof Maintenance

- Identify actions that would void a typical roof warranty and explain why it is important to keep the warranty in effect.
- Name and define the four basic components that make up a flat roof system.
- Explain the differences among a prestressed concrete deck, a precast deck, and a reinforced deck.
- Explain the functions of a vapor barrier.
- Tell why thermal insulation is applied above deck in some applications, and below deck in others.
- List three benefits of coating a flat roof with aggregate or crushed slag.
- Explain how a base flashing and a counter flashing work together to protect a roof.
- Tell how and why a hot vent is usually flashed differently from a cold vent.
- Name three roof conditions that make it necessary to install expansion joints.
- Describe how the components of a flat roof drainage system work together
- Tell how to keep moisture out of parapet walls.
- Describe the causes of blisters, bare spots, and punctures.
- Explain how dirt and debris create maintenance problems on flat roofs.
- Name the most common reasons for vent flashing failure.
- List the steps to take to prevent water from ponding on a flat roof.
- Tell how to set heavy equipment on a flat roof without damaging the membrane.
- Tell what a roofing bond or guarantee usually covers and doesn't cover.
- List the materials and information that a roof inspector should have for his guidance.
- Describe two ways of telling whether the roofing bitumen is asphalt or coal tar.
- Explain how water can seep through roof penetrations, pitch pockets, and parapet walls.
- Describe a simple means for measuring the moisture content in a roof system.
- Name the basic materials that should be stocked for making roof repairs.
- Tell how to repair a split membrane if sealing tape isn't available.
- Describe how to repair a hole in a base flashing.
- Explain how moisture can cause a parapet wall to crack and crumble.
- Explain how to channel a roof leak to a floor drain.
- Describe how to use tools, ladders, and hoists safely when repairing roofs
- Name and describe the three types of single-ply roofing materials.
- Detail the roof-laying methods used with each of these types.
- Explain the six key points that should be checked in the inspection of a single-ply roof.

367 Plumbing Systems Maintenance

- Tell how the main types of valves are constructed and how they operate.
- Compare the different types of valve end connections.
- Name the factors to be considered in the selection of materials for valves.
- List three joints used in cast iron piping and tell how to make them.
- Explain how to assemble screwed and flanged joints in brass and steel piping.
- Give example of the proper use of different pipe wrenches and vises.
- Tell how to assemble copper tubing with soldered, compression, and flared joints.
- Review the procedures for making joints in PVC and CPVC piping.
- Name the chief points involved in the care and correct use of hand tools.
- Describe how to open clogs and repair leaks in plumbing fixtures.
- Compare maintenance procedures for different types of valves.
- Tell how to clear stoppages and repair leaks in the drainage system.
- Explain the maintenance of water heaters, pumps, and piping.
- Describe a basic system for industrial hot water supply and distribution.
- Describe three basic systems for boosting incoming water pressure.
- Describe six lavatory categories and compare the different flushing systems used in water closets and urinals.
- Explain the operation of different types of faucets.
- Give examples of industrial showers, sinks, and drinking fountains.
- State the function of sanitary drainage systems and describe the materials, fittings, and joints used in them.
- Discuss the installation and connection of the piping components of a sanitary drainage system.
- Explain the purpose of floor drains and cleanouts, and where they are needed.
- Tell how to repair leaks and clear stoppages in sanitary drainage piping.
- List the components of a vent system and explain their functions.
- Discuss the materials used for vent pipes, fittings, and joints.
- Explain the importance of air pressure and water flow in DWV systems.
- Discuss the requirements for the installation of piping in a vent system.
- Describe several types of vent system and their applications.
- Describe a basic plumbing system.
- Name the parts of a DWV system and explain their functions.
- Explain the safety requirements for hot water tanks and heaters.

- Describe a hot water circulation system, tell when it must be installed, and explain the advantages of strip heaters.
- Explain the function and installation of the elements in storm water and site drainage systems.
- Name the materials, fittings, and joints used in storm water and site drainage systems.
- Describe how the piping components of storm water and site drainage systems should be installed.
- Compare six different roof drains and give details of their installation.
- Tell how the separate components of a potable water distribution system work together in its operation.
- List the materials suitable for use in a potable water system, the fittings used with them, and the factors to be considered in selecting them.
- Discuss the effects of water pressure and flow in a potable system.
- Give installation details for piping and valves in a potable water system.
- Explain how a potable water system can be contaminated and how contamination can be prevented.
- Explain the selection of materials and the installation of components for a hot water system.
- Describe the operation and application of different water heaters.
- Compare the function and applications of plumbing system valves.
- Tell how water temperature affects the equipment and layout of a hot water distribution system.
- Explain the purpose of the different elements in an industrial cold water supply and distribution system.

374 Locks and Key Systems

- Explain installation procedures for full-mortise, half-mortise, full-surface, and half-surface hinges.
- Differentiate between right-hand and left-hand doors, and between hollow-core and solid-core doors.
- List four different types of hinges.
- Describe how a mortise lock mechanism works.
- Tell what operations are involved in installing a mortise lock.
- Compare the functions of rim spring-bolt locks, rim bolt locks, and jimmy-resistant locks.

- Diagram the construction of a tubular bolt lock.
- Explain how key-in-knob locks, unit locks, and narrow-stile locks operate.
- Explain how to position a mortise lock with the proper setback for installation.
- Describe installation procedures for an auxiliary lock, tubular bolt lock, key-in-knob lock, unit lock, and narrow-stile lock.
- List the tools needed to install locks.
- Describe how lock problems can develop.
- List preventive maintenance practices that promote good lock function.
- Describe the process of opening a cylinder both with and without a key.
- Tell how to clean and lubricate lock mechanisms.
- List common problems with bolts and latches and their remedies.
- Describe how a master key system operates.
- List the advantages and disadvantages of master keying.
- Differentiate between the maison system, keyed-alike system, and sectional system.
- List the information that must be included in the security survey plan, key progression chart, and key issuance files.
- Identify other access control systems, such as card-key systems, electronic systems, and push-button locks.
- Use standard lock and door terminology.
- Identify the mortise lock, auxiliary lock, tubular bolt lock, key-in-knob lock, unit lock, and narrow-stile lock

375 Landscaping Maintenance

- Explain the importance of understanding and using a uniform plant identification system, and name the classifications into which plants are grouped.
- List six essentials of plant life.
- Describe the pH scale and tell how the acidity or alkalinity of a soil affects plant growth.
- Tell how to recognize the symptoms of overwatering and underwatering.
- Name at least four nutrients plants need, explain why each is needed, and tell how to recognize a lack or overabundance of each.
- Give examples of the following: course-textured, medium-textured, and fine-textured trees.
- Describe the three ways in which nursery stock is normally offered for sale.
- List and explain the five steps involved in planting a landscape tree.
- Tell why trees may require pruning and describe the two basic pruning cuts.

- Summarize the safety rules that apply when doing tree maintenance work.
- Tell how lawns and grass plants differ from other types of landscape plants.
- Define and give examples of cool season grasses and warm season grasses.
- Discuss the importance of proper mowing.
- List three things to keep in mind when watering turf.
- Describe how to establish turf by plugging and discuss the advantages and disadvantages of this method.
- List several things to consider when selecting shrubs.
- Explain the different kinds of pruning required by different kinds of shrubs—for example, spring-flowering shrubs, roses, narrow-leaved evergreens, and hedges.
- Explain how to plant and care for vines.
- Name and define the three classes into which flowers fall.
- Give several examples of hardy bulbs and tender bulbs and compare and contrast the methods of care each requires.
- Recognize fungi and the symptoms of bacterial disease and tell how to control them.
- Identify several living things that help control insects.
- Name several different ways of eliminating or controlling weeds and tell when and where each is used.
- Explain the different kinds of pesticides and the ways in which they work.
- List several things to consider when choosing a pesticide.
- Describe some of the many forms in which pesticides come and ways in which they are applied.

451 Cleaning Chemicals

- Identify the goals of the Hazard Communication Standard and the agency responsible for writing and enforcing the standard.
- Explain the purpose and basic content of an MSDS.
- Give examples of the health hazard information contained in MSDSs and how it is used.
- Give examples of the physical hazard information contained in MSDSs and how it is used.
- Describe typical MSDS instructions on special precautions and procedures.
- Define chemical hazard and name the two categories into which they are divided.
- Name and describe the six kinds of health hazards.
- Name the three basic routes of health hazard exposure.
- Discuss common methods of controlling chemical hazards.

- Tell how cationic soaps and detergents differ from anionic soaps and detergents.
- Name an advantage and a disadvantage of a multi-duty cleaners.
- Tell why wetting agents are used in degreasers.
- Define the term pathogenic
- List four kinds of microorganisms capable of causing disease.
- Explain the difference between cleaning and disinfecting
- List three factors that make killing germs a difficult task.
- Define the terms sanitization, disinfection, and sterilization
- State an advantage and a disadvantage for each of the main kinds of disinfectant.
- Explain why it is important to follow product dilution information carefully
- Name the chemicals in cleaning agents that dissolve grease and oil.
- Name and describe the four most important detergency processes.
- Define penetration, suspension, and viscosity as characteristics of cleaning agents.
- Explain how to detect exposure hazards and symptoms.
- List the three kinds of cleaning chemicals.
- Explain the advantages and disadvantages of soaps.
- Compare and contrast soaps and detergents.
- Tell what protective equipment is required when working with solvents.
- Explain how solvent and abrasive cleaners work.
- Describe the purpose of a disinfectant.
- List the important factors to consider when selecting a cleaning product.
- Tell where to find information about correct product usage.
- Explain why it is necessary to use an acid bowl cleaner on toilets and urinals.
- List the characteristics of a good glass cleaner.
- Explain the purpose of absorbents.
- Explain where and why dust control chemicals are used.
- Give three reasons for using furniture polish on unsealed wood.
- List the properties of a good hand cleaner.
- Describe the necessary precautions to take when using drain cleaners.
- Name the three common forms of room deodorant.

452 Floors and Floor Care Equipment

- Describe the three different types of powered sweepers and tell where to use each one.
- Name the different types of drives, power sources, and controls that a typical autoscrubber has, and explain how each functions.

- Explain when and where not to use an autoscrubber.
- List the step-by-step procedures for preparing an autoscrubber to dry vacuum, dry buff, dry buff and dry vacuum, wet vacuum, wet scrub, wet scrub and wet vacuum, and strip.
- Tell how to identify the common resilient floorings, and explain the characteristics of each.
- Name the common natural hard floorings, and explain the characteristics of each.
- Explain how synthetic hard flooring is formed and installed.
- Explain why wood floors must be cleaned with care.
- List the main features of cork flooring.
- Explain where and why iron and steel, conductive, and pedestal floors are used.
- Identify which size floor machine to use for various floor areas.
- Tell which speed range is best for scrubbing, stripping, buffing, and shampooing.
- Explain the relationship between electric motor horsepower ratings and machine size.
- Describe the function and operation of the transmission in a floor machine.
- Explain how to install pads, pad holders, and brushes on a floor machine.
- List the step-by-step operation and maintenance procedures for floor machines.
- Explain the basic operating principle of a vacuum cleaner.
- Describe the four most widely used types of vacuum cleaners and their main parts.
- Identify which machine to use for a particular vacuuming task on a particular surface.
- List common vacuum attachments, and tell when each is used.
- Explain the step-by-step operation and maintenance procedures for the four types of vacuum cleaners.
- Name the three pieces of equipment contained in a single autoscrubber unit.
- Name the three sources of power for powered sweepers, and describe the advantages and disadvantages of each.
- Identify which powered sweeper is best to use in a particular size area, surface, and type of soil.
- Explain the uses and advantages of pressure washers, and explain how they work.
- Tell how to clean and maintain an autoscrubber.
- Describe the different kinds of floor sanders, and explain how to operate a floor sander.
- Tell why you need an edger when sanding wood floors.

453 Maintaining Floors and Other Surfaces

- Tell when to use water-base sealers and when to use solvent-base sealers, and explain how each is applied.

- Name the three basic types of floor finishes and tell how each is applied.
- Explain at least three safety points to remember when refinishing floors.
- Describe the procedures and name the chemicals used for routine and periodic maintenance of resilient flooring.
- Describe the procedures and name the chemicals used for routine and periodic maintenance of concrete, terrazzo, marble, and other natural hard flooring.
- Name the four methods for removing dry dirt and tell when each is used.
- Name the three kinds of mopping (wet cleaning) and tell when each is used.
- Explain how to clean a floor using an autoscrubber.
- Explain why pressure washing sometimes does a better job of cleaning floors than scrubbing does.
- Describe the process of disinfecting a floor.
- Explain how to dry buff and spray buff a floor using a floor machine.
- List four reasons floors need coatings.
- Name the two kinds of floor strippers and tell when each is used.
- Describe the precautions that you must take when using solvent-base strippers.
- Explain the purposes of floor sealers.
- Tell why it is important that a sealer and finish have the same kind of base.
- List the properties of a good floor finish.
- Explain how to test and evaluate a floor finish.
- List the equipment needed and describe the procedures used for scrubbing.
- List the equipment needed and describe the procedures used for stripping various floor coatings from different kinds of floors.
- Describe the processes of etching, screening, and sanding, and explain why each is used.
- Describe the procedures and name the chemicals used for routine and periodic maintenance of synthetic hard flooring.
- Describe the procedures and name the chemicals used for routine and periodic maintenance of wood and cork flooring.
- Describe the procedures and name the chemicals used for routine and periodic maintenance of iron and steel flooring.
- Describe the procedures and name the chemicals used for routine and periodic maintenance of conductive and pedestal floors.
- Identify resilient flooring problems and explain how to avoid and correct them.

- Describe problems encountered in the refinishing of resilient flooring and tell how to avoid and correct them.
- Identify hard flooring problems and explain how to avoid or correct them.
- Define warping and tell how to avoid it.
- Explain how to adjust the conductivity of conductive floors.
- Explain the procedures for emptying trash cans and ashtrays, and tell why it is important to empty them daily.
- Describe the tools you need for dusting, and list the reasons why dusting is important.
- Discuss the cleaning procedures for lamps and lighting fixtures, drinking fountains, and wooden furniture.
- Describe the two methods for washing walls, and tell when to use each method.
- Explain how to keep a chalkboard clean.
- List the steps in cleaning a kitchen.
- Calculate the area of a floor.
- Explain why it is important to remove dry dirt before wet cleaning.

454 Rest Room Care

- List the three kinds of rest room surfaces that you must clean, and tell how to clean each type.
- Describe the different rest room flooring materials, and tell how to recognize and clean each one.
- Describe the common types of walls and ceilings in rest rooms, and tell how to care for each one.
- Name the common types of rest room plumbing fixtures, and describe the features of each.
- Describe the differences among rest rooms in different kinds of buildings.
- Explain how to gather and prepare supplies needed for routine cleaning tasks.
- Explain how to clear and block a rest room for daily cleaning.
- Explain how to remove trash from a rest room's trash cans, sanitary napkin disposals, and ashtrays.
- Explain how to restock paper products and hand soap.
- List the correct sequence of steps for cleaning the surfaces of a rest room.
- Explain daily dry cleaning and wet cleaning procedures for above-floor surfaces of a rest room.
- Explain procedures for daily cleaning of a restroom floor.

- Explain safety precautions that you must take to protect yourself when cleaning plumbing fixtures.
- List the equipment and chemicals needed for cleaning sinks.
- Explain the proper procedure for cleaning sinks.
- List the equipment and chemicals needed for cleaning toilets and urinals.
- Explain the proper procedure for cleaning toilets and urinals.
- List the equipment and chemicals needed for cleaning showers and tubs.
- Explain the proper procedure for cleaning showers and tubs.
- Tell how often to clean rest room ceilings, walls, and partitions.
- Explain how to wash rest room ceilings by hand and with a machine.
- Tell which ceilings must be vacuumed and explain how to vacuum ceilings.
- Explain how to remove graffiti from rest room walls, and how to wash rest room walls and partitions.
- Tell how to scrub, pressure wash, strip, and refinish a rest room floor.
- Explain the difference between scrubbing and/or pressure washing a rest room floor that has a drain and one that does not
- Describe germs in terms of size and reproduction.
- Tell what conditions germs need to live, grow, and multiply, and relate these conditions to restrooms.
- Explain how germs move from one place to another in a rest room.
- List the kinds of disinfectants that kill germs, or stop them from growing.
- Contrast resident and transient odors in a restroom, and explain how to prevent resident odors.
- Explain how, why, and when to use deodorants in a rest room.
- Tell why disinfection must be done, how often it should be done, and how to do it correctly.

455 Carpet and Upholstery Care

- Name the different parts of a carpet and explain the function of each.
- Compare the natural and synthetic fibers used in carpet yarns, and list the advantages and disadvantages of each.
- Describe the construction of the major types of carpet.
- Explain why padding or cushioning is used under carpet, and describe the different padding materials, both natural and synthetic.
- Explain how problems can develop in a carpet that is not installed correctly.

- Name the sources of soil that make a carpet dirty.
- Name the common types of dirt-catching devices, and explain how each works and where it is used.
- List the steps that you should take to police an area for preventive carpet maintenance.
- Explain how weekly vacuuming differs from daily vacuuming, and tell what kind of equipment is used for each.
- Name the parts of a vacuum cleaner, and explain how the vacuum works.
- Explain how to care for carpet in germ-sensitive areas.
- List conditions that lead to static buildup, and explain how carpets can be treated to prevent it.
- Describe the devices that prevent furniture and chair legs from crushing carpet yarn.
- List the factors that help to determine how often you should shampoo a carpet.
- Name the four most common carpet shampooing methods.
- Explain how to make an area ready for shampooing.
- Describe each of the following shampooing methods: water extraction, dry powder, dry foam, and wet foam.
- List advantages and disadvantages of each of the above shampooing methods.
- Explain how to "set the pile" of a carpet after shampooing and tell why it is important.
- Describe several ways of dealing with uneven carpet wear.
- Define the terms stretching, buckling, and rippling.
- Describe the problems that can occur in carpet seams.
- List the carpet problems commonly handled by a custodian as well as those that require the services of an expert.
- Explain how the problems of shedding, sprouting, and pilling differ.
- Name the five most common causes of rapid carpet soiling.
- Explain how to repair crushed pile yarns, cigarette burns, and mildew in carpet.
- Explain the step-by-step procedure for removing an unknown stain from a carpet.
- List the natural and synthetic fibers most frequently used in upholstery fabrics.
- Name the tasks that you should perform as part of daily and weekly upholstery care.
- List the procedures and materials that you should use to remove stains from upholstery.
- Explain why it is important to know what padding or filling materials are underneath upholstery before you shampoo it.
- Describe the step-by-step procedure for preparing to shampoo upholstery.

- Describe wet foam, dry foam, water extraction, and liquid dry cleaning shampooing methods.
- Explain how to solve common upholstery problems, and recognize when to call an expert.

TPC Electrical Training Courses

1005 Introductory - Introduction to Electricity

- Understand fundamentals of electricity such as voltage, current, basics of magnetism and Ohm's Law
- Understand inductance, capacitance, and resistance.
- Understand the basics of DC circuits, including series circuits, parallel circuits, and series parallel circuits.
- Understand fundamental components that control circuit current and voltage, their applications, and their associated symbols

1006 Introductory - Mobile Electricity

- Understand fundamentals of electricity such as voltage, current, basics of magnetism and Ohm's Law
- Understand inductance, capacitance, and resistance
- Understand the basics of DC circuits, including series circuits, parallel circuits, and series parallel circuits
- Understand fundamental components that control circuit current and voltage, their applications, and their associated symbols
- Understand how a battery stores and dispenses electrical power
- Understand the alternator, which generates electricity and works with a voltage regulator to charge the battery and supply electrical power to the rest of the vehicle's electrical system
- Understand the starting system, and the variations of components in the two circuits of the starting system
- Understand remote start and stop features associated with many mobile vehicles

1008 Introductory - ACDC Drives

- Understand Magnetism and Electromagnetism, Direct-Current Motor Terms, Direct-Current Motor Operation, Direct-Current Motor Classification
- Understand AC Motor Hardware, AC Motor Operation, NEMA Classifications
- Understand DC Drives Control Section, Power Section, DC Drive Functions

- Understand AC Drives Control Section, Power Section, AC Drive Functions, Power Conversion
- Understand AC-DC Braking Methods
- Understand Brushless DC Motor Commutation, Motor Performance, Selecting a Brushless Motor
- Understand Brushless Servo Drives, Power Input Section, Power Output Section, Control Section, Input/Output, Servo Actuators

1009 Introductory - Multimeter Basics

- Understand the fundamentals of using electrical testers
- Understand testing circuits
- Understand different circuit components

201 Basic Electricity and Electronics

- List the parts of a transistor.
- State the definition of an integrated circuit.
- Name the parts of a vacuum tube and describe the function of each part.
- Describe an electromagnet.
- Select the best tapes for insulating splices, restoring the outer protecting covering on a splice, and connecting motor leads.
- Explain how to make a pigtail splice and a fixture splice.
- State the purposes of cable protection.
- State the difference between ac and dc.
- Solve for R, E, I, and P in a simple electrical problem.
- Explain how to use lifting magnets, magnetic pulleys, and magnetic clocks.
- State the characteristics of an electrical conductor and an electrical insulator.
- State the definition of electric current.
- Explain the relationship of potential difference to the flow of electric current.
- State the definition of Ohm's Law.
- Identify the purpose and parts of an ammeter.
- Identify symbols for resistors, capacitors, and relays in an electric circuit diagram.
- Explain the operating principles of resistors, capacitors, and inductors.
- State the meaning of each band in the resistor color-code system.
- List the factors to consider when choosing a resistor.
- Explain how to connect capacitors in parallel and in series.
- Explain the difference between a conductor and an insulator.

- Identify a bare conductor, a covered conductor, an insulated conductor, a stranded conductor, a cable, and a cord.
- State the definitions of insulation resistance and dielectric strength.
- Explain the difference between the terms in-phase and out-of-phase in an ac circuit.
- List the ways inductive reactance differs from resistance.
- Solve for potential difference, current, and resistance in a series and parallel circuit.
- Explain the importance of the transformer in ac electricity.
- Explain what a complete cycle of ac consists of and how it is produced.
- State the definition of ac inductance.
- Explain the difference between p-type semiconductor material and n-type semiconductor material.
- Describe the left-hand rule for magnetic field direction.
- Describe how magnetic force operates.
- State the most basic law of magnetic force.
- Describe how a photoelectric device works.
- Identify potential hazards when recharging batteries.
- Explain how to connect cells in series.
- Explain how to connect cells in parallel.
- Explain how liquid affects a static charge.
- State the definition of grounding.
- Explain the relationship between humidity and static electricity.
- List the main methods of producing potential difference.
- State the main difference between a primary cell and a secondary cell.
- State the definition of bonding.
- List the conditions that must exist in order for static electricity to cause ignition.
- List the common causes of static electricity in an industrial plant.
- Describe electron flow.
- State the definition of a cell.
- Describe the structure of an atom.
- Tell the difference between a compound and an element.
- Explain how electrical forces cause objects to attract or repel other objects.

202 Batteries and DC Circuits

- Explain how to conduct an initial charge.
- Discuss the different types of battery charges.

- List the common causes of cell failure.
- Explain how to mix electrolyte correctly.
- Explain how to treat both skin and eyes that have been splashed with acid.
- Define Ohm's Law and use it to solve a problem.
- State the definition of a branch point.
- Solve a problem using the power formula.
- State the definition of Kirchhoff's rules.
- Define work, power, torque, and efficiency.
- Describe a series circuit.
- Solve for E, I, and R in series circuits.
- State the basic rule you must follow when making changes in an equation.
- State the definition of a parallel circuit.
- Explain how to calculate the current in each branch of a parallel circuit.
- Explain how to calculate resistance in a parallel circuit.
- Calculate power in a parallel circuit.
- Find the reciprocal of any value.
- State the definition of a series-parallel circuit.
- Identify series, parallel, and series-parallel circuits.
- Explain how to calculate resistances in a series-parallel circuit.
- Demonstrate how to trace and simplify a circuit.
- Explain how the three types of dc motors differ.
- Demonstrate how to increase and decrease the speed of a dc motor by adding resistors.
- Identify a three-way switch.
- Calculate current and resistance using voltage divider circuits.
- State the difference between a primary cell and a secondary cell.
- Discuss electrochemical action.
- Explain how battery polarization works.
- State the definition of an electrolyte.
- List the factors to consider in selecting a battery.
- List advantages of dry cells.
- State the characteristics of dry cells.
- Explain how to create a 6 V battery from 1.5 V dry cells.
- Name the basic kinds of storage cells in use today.

- Explain how to calculate the rating required in a battery for a specific application.
- Name the items necessary to form a cell.
- Explain how plates in a cell are commonly assembled.
- List the advantages of nickel-cadmium battery.
- Discuss the construction of storage cells.
- List the steps in placing a new dry-charged battery in service.
- Name the three basic methods of charging batteries.
- Explain how to measure a cell's specific gravity.
- List causes of low specific gravity in a cell.
- Tell how to clean a wet, dirty battery cover.

203 Transformers and AC Circuits

- List the factors that determine inductance in a coil.
- State the definition of counter electromotive force.
- State of definition of a waveform.
- Demonstrate how to calculate the frequency of an alternator's output.
- Explain how to calculate an effective value.
- Name the kinds of values that must be used when applying the dc rules and laws to ac circuits.
- Describe a triangle.
- State the definition of a vector.
- Identify the vector representing resistance in a vector diagram.
- Demonstrate how to calculate the total impedance in an ac circuit.
- Name the property of a coil that makes it resist changes in current.
- Name the parts of a capacitor.
- List the factors that affect the amount of charge stored in a capacitor at a given potential difference.
- Demonstrate how to install a multisection electrolytic capacitor.
- State the definition of capacitive reactance.
- State the definition of impedance.
- Explain how to calculate the impedance in series RLC, RL, or RC ac circuits.
- Demonstrate how to find the value of a phase angle for an ac circuit.
- Explain how to calculate the impedance in parallel RLC, RL, or RC ac circuits.
- State the definition of power.
- Demonstrate how to calculate power in an inductive circuit.

- State the reason why capacitors are added to circuits to increase the power factor.
- Explain how to install capacitors correctly.
- List the main advantages of the three-phase ac system.
- Demonstrate how to perform a breakdown test.
- Explain how to locate the exact point of a leak in a welded joint below the liquid level.
- List the steps in inspecting a transformer when a winding fails.
- List problems that are indicated by an increase in transformer operating temperature.
- State the definition of a current transformer.
- Explain what to look for during an inspection of sealed transformers.
- List the functions of an instrument transformer.
- Name general kinds of transformers.
- List the temperature limits for each class of transformer insulation.
- Explain how oil-immersed transformers are cooled.
- Name the common methods of connecting three single-phase transformers for three-phase operation.
- Explain how to select the correct location for a transformer.
- List the kinds of losses that occur in transformers.
- Demonstrate how to convert a frequency in Hz to a frequency in radians per second.
- State the definition of phase sequence.
- Demonstrate how to calculate the RMS power in a three-phase circuit.
- Explain how to measure the total power consumed by the load in a three-phase circuit.
- Explain the difference between the primary winding and the secondary winding in a transformer.
- Explain how the windings are positioned in a core-type transformer.

204.1 Electrical Measuring Instruments

- Describe the purpose of the analog-to-digital converter in a digital meter.
- Define the terms digital meter and analog meter.
- Identify and label graphs of integrator output from a dual-slope integrating meter.
- Explain how time is related to voltage measurement in an integrating digital meter.
- Differentiate among the terms accuracy, sensitivity, and resolution.
- Explain how a D'Arsonval meter movement works.
- Describe the parallax effect, and explain how to avoid it when using an analog meter.
- State the sensitivity formula for an analog meter.
- Describe the differences and similarities between an analog ammeter and a voltmeter.

- Explain how ammeters and voltmeters are protected internally from overcurrent.
- Explain how a make-then-break switch works.
- List three safety precautions to take when using multimeters.
- Describe how an analog oscilloscope works.
- Describe advantages of a digital oscilloscope over an analog oscilloscope.
- Demonstrate how to measure voltage with an oscilloscope.
- Show two methods of determining phase angles with an oscilloscope.
- Identify which meters should be connected in series in a circuit and which should be connected in parallel.
- Describe how an analog wattmeter works.
- Explain how it is possible to overload a wattmeter, even with the meter's pointer at less than full-scale deflection.
- Explain characteristic differences between a series ohmmeter and a shunt ohmmeter.
- Explain why ohmmeter scales read from right to left, instead of left to right, and why they are nonlinear.
- Describe the internal circuits and basic operation of an opposed-coil megohmmeter.
- State the primary safety precaution to take when using an ohmmeter.
- Describe two methods used by ohmmeter manufacturers to extend the range of their instruments.
- Explain how to test for opens, shorts, and grounds, using a megohmmeter.
- Describe how to make zero-adjustments on ohmmeters and megohmmeters.
- Explain why variable resistors are needed in battery-powered ohmmeters.
- Demonstrate how to measure ac and dc current and voltage with a multimeter.
- Describe the function of a current probe.
- Explain how to isolate the source of a glitch with a graphical multimeter.
- Demonstrate how to read the screen display of a graphical multimeter in the Trend mode.
- Explain why you set a meter to its highest range before taking your first measurement.
- Define autoranging and autopolarity.

205.1 Electrical Safety and Protection - v2

- List the three main factors that determine the effect of electric current on the human body.
- Explain what to do if a person is a victim of electric shock.
- Name four precautions you can take to guard against electric shock.

- Define the term qualified person.
- Summarize the basic rules of electrical safety.
- Describe appropriate clothing and PPE to wear when working with electricity.
- Explain first aid procedures for eyes.
- Describe the devices used to lock out power.
- Tell how to keep plant personnel out of an area where electrical work is being performed.
- Explain the purpose of a voltage tester.
- Explain the concepts of energy control and zero energy state.
- Summarize the OSHA lockout procedure.
- Explain how portable power tools are grounded.
- List some common symptoms of electric shock.
- Summarize the steps involved in administering CPR.
- Understand the purpose and scope of the National Electrical Code.
- Define key terms related to the National Electrical Code.
- Determine requirements for electrical installations.
- Contrast current electricity and static electricity and explain why each can be hazardous.
- Identify the correct extinguisher to use on flammable liquid fires and on energized electrical equipment fires.
- Explain how a dual-element cartridge fuse works.
- Locate and reference common National Electrical Code articles.
- Identify common calculation tables.
- State the NEC rules on installing fuses.
- Explain how to test a circuit for proper grounding.
- State the reason why circuits should be grounded.
- Explain how a circuit breaker works.
- Describe molded-case circuit breakers.
- List the steps involved in fuse replacement and/or circuit breaker reset.
- List the steps in determining the correct rating of the motor feeder protection.
- Explain how to select a thermal overload relay.
- Explain how a ground-fault circuit interrupter works.
- Explain how thermostatic, resistance, and thermocouple detectors work.
- Contrast temperature-sensing devices and current-sensing devices.
- Explain how various relays provide motor protection.

- Define single phasing.

206 DC Equipment and Controls

- List the advantages of dc over ac.
- List the brush problems caused by eddy currents.
- State the criteria for selecting replacement semiconductors.
- State the definition of a silicon controlled rectifier.
- Explain how an SCR works.
- Explain how to increase the effective current and the power delivered to a motor by an SCR motor control.
- List four dc applications of SCRs.
- List four ac applications of SCRs.
- Explain how to test field coils to determine the condition of the insulation.
- List the signs of a short-circuited field coil in a machine.
- Explain how to replace a field coil in a machine.
- Discuss how to maintain relay contacts.
- Name the criteria for satisfactory commutation.
- Name three types of batteries commonly used in the plant.
- Explain how the electroplating process works.
- Explain the difference between straight polarity and reversed polarity in arc welding.
- State the definition of residual magnetism.
- Explain the effects of distance on magnetic field strength.
- Discuss the characteristics and uses of solenoids.
- Discuss the characteristics of relays.
- Explain the function of each of the main parts of the dc generator.
- Explain how to increase the number of pulses during each rotation of an armature.
- Demonstrate how to combine the shunt field and series field to produce a compound generator.
- State the reasons why electrical losses, magnetic losses, and mechanical losses occur in the dc generator.
- Explain what happens during self-induction and commutation.
- Define CEMF.
- State the difference between speed regulation and speed control.
- Name the kinds of dc motors.
- Explain the different operating characteristics of series, shunt, and compound motors.

- Name the basic parts of an armature assembly.
- Describe the main differences between a lap winding and a wave winding.
- List the characteristics of a single-reentrant simplex-lap winding.
- State the definition of copper loss, eddy-current loss, and hysteresis loss.
- Demonstrate how to perform preventive maintenance on an armature.
- Name three factors that determine the performance and reliability of a relay.
- Name the six types of commonly used relays.
- Explain the operation of each type of relay.
- Explain dynamic braking.
- Describe how a disc brake is attached to a motor.
- List the kinds of functions performed by motor-control devices.
- Name the types of motor controllers and discuss their operating characteristics.
- Explain how each of the three kinds of overload relays works.
- Name the kinds of resets for overload relays.
- Discuss the operating principles of vacuum tubes and rectifiers.
- Name the four types of filters commonly used in rectifier circuits.
- List common causes of semiconductor failure.

207 Single-Phase Motors

- Discuss the functions of the major motor components.
- List the reasons a repulsion motor might fail to start.
- Explain eddy-current loss in the universal motor.
- List the advantages of a universal motor.
- Explain how the speed of the universal motor is controlled.
- List the criteria for selecting carbon brushes for universal motors.
- State reasons why a universal motor might have poor torque.
- State the definition of a salient pole.
- Explain the operating principles of a shaded-pole motor.
- Discuss the operating principles of a hysteresis motor.
- Explain the difference between an unexcited synchronous motor and an excited synchronous motor.
- State the definition of the term synchro.
- Describe motor construction in a synchro.
- Demonstrate how to calculate terminal-to-terminal stator voltage.
- State the reason why the control transformer is important in a synchro control system.

- Explain how to connect a differential synchro system.
- State the definition of a servomechanism.
- List the four characteristics needed to keep a regulated quantity matched to a reference value in a servomechanism.
- Explain how an amplidyne control system works.
- Discuss how to control overtravel in a servomechanism.
- Explain how to determine conductor size for motors.
- State the definition of a controller.
- List the conditions under which the frames of stationary motors must be grounded.
- Demonstrate how to determine the size of a dual-element fuse when two or more motors are connected to one feeder.
- List the electrical and mechanical factors to consider in selecting a motor for a specific application.
- Demonstrate how to test bearings for wear.
- Explain how to test capacitors.
- State the reason why proper belt tension is important.
- List the common causes of excessive brush sparking.
- Explain how the running windings are connected to make a dual-voltage motor run on either 120 or 240 volts.
- Select the best capacitor to use as a substitute for a defective capacitor when an identical unit is not available.
- List problems that cause the circuit breaker to trip when you turn on a capacitor motor.
- Discuss the operating principles of a repulsion-start induction-run motor.
- Explain how to seat new brushes on the commutator.
- Demonstrate how to calculate the number of electrical degrees in one complete rotation of a motor.
- Explain how a centrifugal switch works.
- State the reason why a second stator winding is important in the single-phase induction motor.
- Explain how to identify motor leads when there are no tags or colors to identify them.
- Describe a skein winding.
- List the ways to change the speed of a motor by changing the number of poles.
- Discuss some common motor problems.
- State the definition of a capacitor.
- Explain how to make a split-phase motor operate as a capacitor-start motor.

- List the parts of a rotor.
- List the data given on a typical motor nameplate.
- Explain how an induction motor works.

208 Three-Phase Systems

- Describe a squirrel-cage rotor.
- List the factors that determine the strength of the magnetic field in an induction motor.
- Discuss pole-phase relationships.
- Demonstrate how to reverse the rotation direction of the magnetic field.
- Discuss the relationship between rotor speed and frequency.
- List the main parts of the stator.
- List operating characteristics of a wound-rotor motor.
- Demonstrate how to check rotor windings for short circuits.
- State the definition of a standard motor.
- List factors that contribute to the torque of an industrial synchronous motor during starting.
- Explain the effects of an amortisseur winding in a synchronous motor.
- State the definition of pull-in torque.
- State the reason why using synchronous motors can increase a low power factor in a plant.
- List the characteristics of brushless synchronous motors.
- Discuss the operating characteristics of multispeed induction motors.
- Select the best motor for driving equipment that requires the same torque at both high and low speeds.
- State the definition of a variable-torque motor.
- Explain the difference between a constant-horsepower motor and a constant-torque motor.
- List the steps in measuring the resistance of the insulation on motor windings.
- Explain how to raise the temperature of a motor winding.
- List the steps in lubricating motor bearings.
- List the conditions that must exist before you can lubricate bearings.
- Explain how a motor starter works.
- Explain the difference between open transition and closed transition.
- Name the common kinds of reduced-voltage starters.
- List the steps in inspecting motor starters.

- Explain how to select the best motor starter for a particular application.
- Explain how to prevent backspin.
- Describe a three-phase alternator.
- Describe the plugging process.
- Explain the difference between low-voltage release and low-voltage protection.
- State the reasons why 240 V systems are not as widely used as are 480 V systems.
- Explain the difference between system grounding and equipment grounding.
- List the benefits of system grounding.
- Explain how an overcurrent relay works.
- Name common circuit-opening devices.
- Discuss the operating characteristics of alternators.
- List the characteristics that must be considered when you work on alternator windings.
- Name the causes of change in potential difference between terminals as the load changes.
- Demonstrate how to calculate three-phase power in an alternator.
- Explain how an automatic auxiliary generator works.
- List the methods of overcoming voltage-drop problems when starting loads.
- List the parts of a hydraulic starting system.
- State the definition of a prime mover.
- List the four guidelines to follow when troubleshooting or performing routine maintenance on generators.

209 AC Control Equipment

- Describe the difference between a manual starter and a magnetic starter.
- Explain the function of a shading coil in a magnetic starter.
- Explain the effects of low voltage on a controller.
- State the reason why holding-circuit interlocks are required on magnetic starters and contactors.
- Demonstrate how to reverse the shaft rotation of a three-phase motor.
- Discuss the characteristics of industrial switches and controls.
- Identify the five most commonly used NEMA pushbutton stations.
- Demonstrate how to mount an oil-tight control station both vertically and horizontally.
- Explain the difference between standard and press-to-test indicating lights.
- Explain how a three-wire control circuit works.
- List the main parts of a precision snap-action limit switch.

- Describe the contact arrangement of a snapswitch.
- Describe the kinds of actuators used in limit switches.
- List the rules for the proper design and application of limit switch cams.
- Explain how a mercury switch works.
- Explain how a drum switch works.
- Select the best switch for stopping a motor quickly.
- List the criteria for selecting a plugging switch.
- Identify different types of pressure switches.
- State the definition of pressure differential.
- Explain how a reset timer works.
- Describe the different types of timers.
- Compare and contrast an electric counter and a time totalizer.
- Select the best control device for use where a machine cannot be controlled by time.
- Demonstrate how to set up a chart for a programmed control circuit.
- State the definition of a relay.
- Explain the function of relay contacts.
- Select the best relay for use where large movement of the contacts or high contact force is required.
- List the advantages of a reed relay.
- Tell why industrial relays usually have double-break contacts.
- List the requirements an enclosure must meet in order to be called explosionproof.
- List the characteristics of switchgear and industrial controls in hazardous conditions.
- List three situations in hazardous locations that require the use of seals.
- List the three basic conditions that can cause fire or explosion.
- Demonstrate how to terminate armored cable that enters an explosionproof housing.
- Name the two relays required for automatic starting of a synchronous motor.
- Explain how an automatic sequence-accelerating relay works.
- Select the best starter for use where the highest possible starting torque per ampere of line current is required.
- List the characteristics of different types of resistance starters.
- Describe a Y-delta starter.
- Define the term motor control center.
- Name the main advantages and disadvantages of back-to-back MCC construction.
- Explain how to install an MCC.
- Define a note, a caution, and a warning as each relates to MCC equipment.

- List the checks to conduct prior to releasing an MCC for plant operation.
- State the function of terminal blocks.
- Demonstrate how to make a terminal connection.
- Tell when to use different types of connectors.
- Describe the proper lacing of wires in a control panel.
- Explain when and how to use a wiring duct.

210 Electrical Troubleshooting

- Explain how undervoltage release works.
- Describe how to troubleshoot a motor circuit.
- Identify a control relay on an electrical schematic.
- State the NEC requirements for fuses in ungrounded conductors.
- Explain component numbering on electrical schematics.
- Name the kinds of drawings used by electrical specialists.
- Identify electrical symbols commonly used for building diagrams.
- Describe a one-line diagram.
- Discuss the different types of drawing characteristics.
- Explain how severe three-phase voltage unbalance affects a three-phase motor.
- List the advantages of inherent protection.
- Describe how to use a checking-sequence chart.
- Select the best starter for use where it is undesirable to put a heavy load on the power supply.
- Explain how to change the speed of a squirrel-cage motor.
- Explain the effects of age on a selenium rectifier.
- Name the protective devices used in electrical systems and pneumatic systems.
- State the definition of a bistable device.
- List the functions of a static control device.
- List causes of electrical and mechanical vibration in a dc motor.
- Explain how oil saturation affects brushes in a dc motor.
- Explain how maximum bearing operating temperature is determined.
- List problems in the motor control that can cause sudden or unexpected changes in motor speed.
- Explain how to salvage a water-soaked motor.
- Identify various kinds of three-phase motor failures.

- Demonstrate how to conduct a balanced-current test on a three-phase, Y-connected winding.
- List the reasons why a magnet coil burns or short-circuits.
- List the steps in troubleshooting a defective motor.
- Explain how a mechanical latching relay works.
- Explain how an electronic timing relay operates.
- Demonstrate how to reverse the rotation of a three-phase induction motor.
- Explain the function of limit switches in reversing-motor applications.
- List the symptoms of a reversed phase in a three-phase winding.
- List the steps in troubleshooting a new machine.
- List the information to be included in a motor location file.
- Select the best method for identifying a motor.
- List the features that must appear on an elementary wiring diagram to make it comply with JIC standards.
- Explain how to identify external leads that have become defaced.
- Demonstrate how to test for an open circuit in a split-phase motor.
- Describe the elements of a planned maintenance program.
- Explain the function of lamps, ballasts, and lighting controls.
- Describe the basic troubleshooting process.
- Detail how to troubleshoot common lamp-ballast system problems.
- Describe lighting system commissioning.
- Detail how to troubleshoot common occupancy-sensor and dimming-system problems.
- Name and describe the elements of a sequence of operation.

211 Electrical Safety in the Workplace - Understanding NFPA 70E v2015

- Determine the general maintenance requirements for electrical equipment.
- Identify safety-related maintenance practices.
- Identify alerting techniques.
- Learn safety procedures to follow while working with overhead lines.
- Recognize electrical hazards and know when it is justifiable to work near such hazards.
- Understand the purpose and use of energized electrical work permits.
- Determine shock hazards associated with approach boundaries.
- Determine required arc flash protection.
- Determine the type of personal protective equipment required for a task.

- Develop an understanding of insulated tools and other protective equipment.
- Recognize terms that are common to NFPA 70E and the NEC.
- State the purpose and scope of NFPA 70E Chapter 1 and the responsibilities of employer and employee.
- Give an overview of the contents of Article 110.
- Describe the relationship between host employers and contract employers.
- Identify the training requirements, types of training, and documentation procedures covered in the article.
- Explain how to develop an electrical safety program.
- Identify the risks of working with electrical hazards.
- Explain how to use test equipment and instruments safely.
- Understand the process of achieving an electrically safe work condition.
- Explain lockout/tagout principles and procedures.
- Describe the different forms of control procedures.
- Define the requirements for lockout/tagout devices.
- Identify the procedures for removing and releasing lockout/tagout devices.
- Understand the requirements for temporary grounding equipment.
- Define and understand accessibility terms.
- Explain how and why NFPA 70E was created.
- State the purpose of NFPA 70E.
- Understand how OSHA can use NFPA 70E in enforcement actions.
- Explain which areas are covered by NFPA 70E and which are not covered.
- Explain how NFPA 70E is arranged and organized.
- State the differences among mandatory rules, permissive rules, and explanatory material.
- Understand the importance of terms described in Article 100.
- Define terms related to electrical safety and hazards.
- Define terms related to electrical grounding and ground fault equipment.
- Determine to what degree fuses and circuit breakers should be maintained.
- Understand the maintenance of equipment in hazardous locations.
- Explain the requirements for maintaining and testing personal protective equipment.
- Understand the hazards of working with special electrical equipment.
- Determine the safety requirements for special equipment.
- Identify safe work practices for electrolytic cells.
- Identify safe work practices for installing and maintaining batteries.

- Identify safe work practices for lasers.
- Identify safe work practices for power electronic equipment.
- Identify safe work practices for laboratories.
- Identify safe work practices for capacitors.
- Reference publications related to NFPA 70E.
- Obtain additional information related to NFPA 70E.
- Identify examples of approach and arc flash boundaries.
- Develop a safety program and hazard/risk forms.
- Discuss lockout/tagout procedures.
- Be aware of the National Electrical Code references related to NFPA 70E.
- Discharge capacitors safely.
- Describe the electrical maintenance requirements for facilities.

TPC Industrial Electronics

251 Semiconductors

- Discuss the advantages of PCBs over direct wiring.
- Describe the three classes of surface mount assemblies.
- Compare various soldering methods and discuss the advantages and disadvantages of each.
- Describe PCB connectors and mountings
- Discuss PCB repair techniques and limitations.
- Describe the differences between an npn transistor and a pnp transistor and identify the schematic symbol for each.
- Discuss transistor performance in the active region, saturation region, and cutoff region.
- Explain how the three kinds of transistor connections affect circuit values.
- Discuss four common transistor characteristics.
- Discuss various ways of classifying integrated circuits.
- Describe several kinds of semiconductor packages.
- Explain how to identify leads.
- Describe methods for mounting components on PCBs and chassis.
- Explain how to use manufacturers' data sheets.
- Discuss the analysis of circuits by Q points and by characteristics.
- Explain how single-sided, double-sided, and multilayer boards are made.

- Explain why both flexible boards and rigid boards are used for printed circuits, and discuss the advantages and disadvantages of each.
- Discuss the basic structure of a semiconductor atom and the movement of free electrons and holes.
- Discuss the purification and doping of semiconductors.
- Describe the p-type region, n-type region, and junction of a pn junction diode.
- Discuss the characteristic curves and specification ratings of a diode.
- Describe the operation of a light-emitting diode, a photoconductive device, and a photovoltaic device.
- Discuss the importance of various environmental conditions to semiconductor operation.
- Discuss the effect of ESD on semiconductor devices and list several ways of preventing ESD in any work area.
- Discuss the requirements of a static-free workstation, and the proper techniques for using tools at the workstation.
- Describe ways to minimize ESD problems during packing and shipping.
- Explain how power conditioning prevents line power problems.
- Describe ways of preventing damage from radio frequency interference (RFI) and electromagnetic interference (EMI).

252 Power Supplies

- Discuss the basic functions of power supplies and power conditioners.
- Describe dc-to-dc, ac-to-ac, ac-to-dc, and dc-to-ac power supplies.
- Compare the operation of transformer-driven and oscillator-driven inverters.
- Discuss the functions of filters, voltage regulators, voltage dividers, switching power supplies, and ferroresonant power supplies.
- Explain why low voltages can be dangerous.
- Explain the difference between a battery and a cell and identify symbols for each.
- Describe the parts of an electrochemical cell.
- Compare the characteristics and uses of Leclanché, high-energy, and alkaline carbon-zinc cells.
- Discuss battery-recharging problems and explain how to check for overcharging.
- Discuss ways to maintain and dispose of chemical cells and batteries safely.
- Discuss the use of five kinds of nonchemical energy sources and recent developments in cells and batteries.

- Define the term rectifier.
- Explain how to interpret diode ratings on a manufacturer's specification sheet.
- Compare the effects of connecting diodes in parallel and in series.
- Describe the operation of a silicon-controlled rectifier.
- Compare the operation of half-wave and full-wave rectifiers.
- Discuss the operation of bridge and three-phase rectifiers and explain how voltage multipliers work.
- Name several kinds of filters used in power supplies.
- Discuss the effects of ripple and describe ways ripple is measured.
- Discuss the use of capacitors, inductors, and resistors in filter circuits.
- Compare the advantages and disadvantages of capacitance, inductance, RC, and LC power supply filters.
- Explain why capacitor power supplies should include bleeder resistors.
- Discuss the uses of bypass filters and input filters.
- Discuss the purposes of voltage regulators in power supplies.
- Explain the function of the control circuit and the current limiting circuit in series voltage regulators.
- Discuss the advantages of IC voltage regulators.
- Describe the operation of switching regulators and explain how it differs from that of other kinds of regulators.
- Discuss the use of SCRs and triacs in primary circuit regulators.
- Discuss at least five kinds of test equipment and tools used to troubleshoot power supplies.
- Describe the three main steps in troubleshooting a power supply.
- Describe the basic procedures for preliminary checks and power-off visual inspection and fuse tests.
- Describe the basic procedures for power-on tests and output tests.
- Explain how to perform section tests and part tests.

253 Amplifiers

- Explain how zener diodes are used in squaring circuits.
- Explain how integrators and comparators work.
- Describe basic procedures for troubleshooting single-stage and multistage amplifiers.
- Explain how dc analysis, ac analysis, and troubleshooting trees are used in amplifier maintenance.

- Explain how to measure amplifier gain and power supply performance.
- Describe the procedures for troubleshooting resistors, capacitors, and op amps.
- Explain how gain, bandwidth, and distortion relate to amplifier operation.
- Compare bipolar transistor amplifiers and FET amplifiers.
- Explain how to use characteristic curves to predict transistor performance.
- Explain how to use an input/output curve to determine transistor gain.
- Discuss the effect of ambient temperature on amplifier performance.
- Discuss the uses of operational amplifiers and switching amplifiers.
- Discuss the transistor characteristics that define operating region limits.
- Explain how to draw an amplifier load line.
- Explain how to find the operating point of an amplifier.
- Compare the advantages of inverting amplifiers and noninverting amplifiers.
- Describe the operation of inverting amplifiers in terms of virtual ground.
- Compare the properties of an ideal op amp and a typical actual op amp.
- Describe the operation of differential amplifiers.
- Compare the advantages and disadvantages of capacitive-coupled, transformer-coupled, and direct-coupled amplifiers.
- Explain how to calculate multistage amplifier gain and bandwidth.
- Discuss the importance of impedance matching in interconnecting circuits.
- Explain how to calculate amplifier power gain, efficiency, current gain, and voltage gain.
- Explain how nonlinearity and clipping cause amplifier distortion.
- Discuss five ways that amplifiers can be classified and compare Class A, AB, B, and C amplifiers.
- Discuss biasing as a means of establishing a stable operating point in an amplifier circuit.

254 Oscillators

- Describe the conditions needed to start and to sustain oscillation.
- Explain how positive feedback affects oscillation.
- Name three kinds of feedback networks used in oscillators.
- Discuss the advantages and disadvantages of tuned circuits, phase-shift oscillators, and crystal oscillators.
- Describe several common oscillator circuits.
- Discuss the differences between sine wave oscillators and square wave switching circuits.

- Explain how rise time and the time constant affect flip-flop circuits.
- Compare the operation of discrete transistor one-shots and IC one-shots.
- Explain how IC pairs of one-shots or IC op amps form an astable multivibrator.
- Describe the operation of bistable flip-flops.
- Explain how negative resistance enables the UJT relaxation oscillator to be used as a logic clock.
- Discuss the effect of hysteresis on logic clock operation and describe the operation of the Schmitt trigger circuit.
- Describe the operation of ripple counters and other frequency dividers.
- Discuss problems caused by real-world (nonideal) logic clocks.
- Discuss the composition of waveforms and explain how filters change the shapes of waveforms.
- Compare the frequency characteristics of low-pass and high-pass filters and of band-pass and band-reject filters.
- Discuss the calculation of time constants in timing circuits.
- Describe methods of creating and shaping complex waveforms, including the differentiator and integrator circuits.
- Explain briefly how digital waveforms are generated with a microprocessor.
- Discuss the basic requirements of four kinds of equipment used to test oscillators.
- Describe good general practices in troubleshooting oscillator components and circuits.
- Describe the steps in tracing oscillator circuit operation and selecting test points for monitoring waveforms.
- Discuss the steps in troubleshooting multivibrators, one-shots, and flip-flops.
- Discuss troubleshooting methods for sequential logic circuits, including clocks.
- Discuss troubleshooting methods for frequency dividers and filters.
- Compare combinational logic, synchronous logic, and sequential logic.
- Explain how logic clocks are generated.

291 Digital Logic Systems

- List the major steps in efficient troubleshooting.
- Name information sources for identifying system malfunctions.
- Explain how to trace a faulty component by using a troubleshooting tree.
- Explain how to use various kinds of test equipment to pinpoint system faults.
- Explain the difference between digital and analog circuits.
- Describe AND, NOT, and OR logic functions.

- Explain how solid-state switches can perform logic functions.
- Compare equivalent NAND and NOR gates using positive and negative logic.
- Discuss the importance of TTL and CMOS circuits.
- Describe the function of a logic clock.
- Explain the operation of a flip-flop.
- Discuss the differences among clocked R-S flip-flops, D-latches, and J-K master-slave flip-flops.
- Explain how to convert between the decimal and binary number systems.
- Discuss the use of BCD and the octal and hexadecimal number systems.
- Explain the operation of each of the following counters: ripple, BCD, synchronous, and up/down.
- Describe the operation of a shift register.
- Discuss the difference between multiplexers and decoders/demultiplexers.
- Define the terms read, write, serial access, and random access as they apply to memories.
- Discuss the purposes of RAM and ROM devices.
- Describe the sections of a basic logic system.
- Compare a ROM, a PROM, and a PLA.
- Name the basic parts of a microprocessor.
- Describe common kinds of I/O interfaces and data displays.
- List the advantages and disadvantages of both serial data transfer and parallel data transfer.
- Describe seven external faults that can affect solid-state circuits.

TPC Welding Online Training

416 Blueprint Reading for Welders

- Define and identify common fractions and decimal fractions.
- Define the term equivalent fraction.
- Perform calculations using common fractions and decimal fractions.
- Convert between common fractions and decimal fractions.
- Read and perform measurements using a standard rule or tape measure.
- Explain the use of calculators in welding.
- Explain the importance of information on blueprints.
- Explain the differences between assembly drawings and detail drawings.
- Describe methods used to create and reproduce blueprints.

- Define and describe parts of a blueprint.
- Identify elements located within the title block of a detail drawing.
- List methods of care and security of blueprints.
- Identify the standard lines used on blueprints.
- Explain the meaning and applications of standard lines on blueprints.
- Identify common views used on a blueprint.
- Name the advantages and disadvantages of various projection types.
- Explain the concept of visualization.
- Identify and describe the five basic weld joints.
- Define the following terms: bead, stringer bead, weave bead, base metal, filler metal, root pass, hot pass, fill pass, cap, hardfacing.
- Identify and describe the basic weld types.
- Name the basic welding positions and give advantages of the flat position.
- Identify which side of a structure a weld is to be made from.
- Identify the kind of chamfer to be cut on a joint to be welded, and which part is to be chamfered.
- State the required dimensions of a weld.
- Identify the contour required on a finished weld.
- State how a weld contour is to be finished.
- Differentiate between welds that are to be made at the site of final assembly and welds that are to be made before the parts are shipped to the site.
- Explain the concepts of squares and square roots of numbers.
- Define the following kinds of angles: zero degree, acute, straight, right, and obtuse.
- State the Pythagorean Theorem and explain its usefulness.
- Define the following terms related to circles: radius, diameter, arc, and circumference.
- Give the equations for finding a circle's circumference and area if you know its radius.
- Explain the use of the following measuring tools: calipers, micrometers, and protractors.
- Demonstrate how to convert measurements from inches to millimeters and from millimeters to inches.

417 Welding Principles

- Compare the oxyfuel and arc welding processes and compare the SMAW, GMAW, and GTAW processes.
- Describe and sketch the following kinds of joints: butt, lap, tee, corner, and edge.

- Describe the following kinds of welds—groove, fillet, plug, slot, spot, and seam.
- Name and locate the parts of a weld.
- Discuss basic considerations in joint design and fitup.
- Explain the importance of good housekeeping in an area where welding is taking place.
- List at least three precautions to take to avoid fires and explosions when welding.
- Describe two methods of protecting yourself against the fumes and gases associated with welding.
- Describe the personal protective equipment required when welding.
- Explain the precautions to take when using and handling cylinders and regulators.
- Briefly describe the oxyfuel welding process and the components of an oxyfuel welding outfit, including the lighting device.
- Discuss safety precautions and personal protective gear required for working with oxyfuel equipment.
- List the steps involved in preparing to weld.
- Compare the neutral, carburizing, and oxidizing flames.
- List the steps in safely shutting down an oxyfuel welding system.
- List similarities and dissimilarities between oxyfuel welding and arc welding.
- Describe the effects of electrode selection, current, arc length, and travel speed on arc welding procedures.
- Describe common causes of arc blow, a hard-to-start arc, and spatter, and explain why proper fitup is important.
- Define the terms overlap, undercut, blowhole, and inclusion and explain the causes of each.
- Explain how expansion and contraction can be controlled when welding.
- Name and describe the various tests used to identify metals.
- Identify which side of a structure a weld is to be made from.
- Identify the kind of chamfer to be cut on a joint to be welded, and which part is to be chamfered.
- State the required dimensions of a weld.
- Identify the contour required on a finished weld.
- State how a weld contour is to be finished.
- Differentiate between welds that are to be made at the site of final assembly and welds that are to be made before the parts are shipped to the site.
- Describe the electric welding circuit, including choice of ac or dc, dc polarity, and power sources.

- Discuss welding machine ratings in terms of amperage and duty cycle and describe features and uses of transformer, generator, rectifier, and inverter welding machines.
- Discuss welding cable considerations and describe the electrodes and electrode holders used for SMAW, GMAW, and GTAW processes.
- Discuss the personal safety gear and precautions necessary for arc welding and explain how arc welding accessories are used.
- Explain what considerations affect the selection of a welding process.
- Describe the four welding positions.
- Explain why overhead welds are difficult to make and tell how to make them.
- Describe the preparation required for oxyfuel welding, SMAW, GMAW, and GTAW processes.
- Describe the procedures involved in oxyfuel welding, SMAW, GMAW, and GTAW processes.
- Describe fusion welding, resistance welding, filler rods, and electrodes.

418 Oxyfuel Operations

- Explain important special considerations in braze welding cast and malleable iron, brazing aluminum, and brazing stainless steel.
- List the safety precautions necessary for brazing and braze welding operations.
- Explain how soldering differs from brazing and describe the materials and procedures used in soldering.
- Define hard face welding and thermal spraying as used for surfacing purposes and discuss general uses of each.
- Discuss advantages and disadvantages of detonation-gun, plasma, and electric arc thermal spraying and explain how each is done.
- Describe the processes of torch hard facing and flame spraying.
- Name several common surfacing materials and discuss one or more characteristics of each.
- List the steps, including those for surface preparation, in repairing a shaft by means of thermal spraying.
- Discuss the safety precautions necessary to prevent or minimize hazards from surfacing processes.
- Explain methods used on metals that are otherwise difficult to cut.
- Compare and contrast brazing, braze welding, and oxyfuel fusion welding.
- Describe the materials and procedures used in brazing and braze welding.

- Explain how oxyfuel welding joins metals and how it differs from arc welding.
- Explain how braze welding and torch brazing are different from oxyfuel welding and from each other.
- Discuss the purposes for using flux and characteristics that make a flux suitable for an application.
- Compare the appearance and general uses of the carburizing flame, neutral flame, and oxidizing flame.
- Explain why preheating and postheating are used.
- List important considerations in welding common mild steels, stainless steel, and cast and wrought iron.
- Discuss characteristics of aluminum that are important in welding.
- Explain how to use aluminum alloy designations.
- Describe procedures used in aluminum joint preparation and in aluminum welding.
- Discuss characteristics of copper and copper alloys that are important in welding.
- Discuss procedures for welding copper, brass, and bronze.
- Discuss procedures for welding lead, nickel, and magnesium.
- Summarize general standard procedures for making optimum welds.
- Explain the similarities and differences between oxyfuel cutting and oxyfuel welding.
- Describe the equipment and safety precautions necessary for torch cutting and list standard steps in the torch cutting operation.
- Describe special equipment or methods used in cutting bevels, piercing holes, cutting circles, and cutting away rivets.
- Explain why gouging, scarfing, and washing are used.

419 Arc Welding Operations

- Observe specific procedures when welding alloy steels.
- Describe some of the methods of identifying different nonferrous metals.
- Name the special properties of several nonferrous metals and explain how these properties affect welding preparations and procedures.
- Compare seven arc cutting processes used for edge preparation of nonferrous metals.
- Explain proper methods of cleaning nonferrous metals prior to welding.
- Identify the welding processes that are suitable for nonferrous metals.
- Compare the advantages of welded pipe joints to bolted or screwed connections.
- Discuss pipe welding codes and what they cover.

- Describe the welding processes used for joining pipe and their respective advantages and disadvantages.
- Identify some special methods and accessories that are used in pipe welding as opposed to flat welding.
- Give examples of the uses of preheating and postheating in pipe welding.
- List several purposes of hard facing and rebuilding.
- Identify the different types of surfacing alloys and their particular uses.
- Describe effective cross-checking and explain why it is desirable.
- Explain the special techniques used in hard facing and tell why they are necessary.
- Name the welding processes used in hard facing and tell why they are adapted to this work.
- Describe correct procedures for handling, storing, and conserving electrodes.
- Name and describe the three basic types of metal transfer for GMAW.
- Name the most common shielding gases used in GMAW and tell what factors influence their selection.
- List factors that affect the selection of an electrode for GMAW.
- Describe GMAW gun operation.
- Define the heat-affected zone and tell what changes can occur there during welding.
- Explain the benefit of preheating and when it should be used.
- List several factors in welding jobs that make postheating advisable.
- Describe methods and materials for preheating and postheating.
- Define ferrous metals and describe their characteristics, including weldability.
- Explain cleaning and edge preparation required prior to welding ferrous metals.
- Name the welding processes and practices that are used for different types and thicknesses of ferrous metals.
- List several different electrode types and their advantages for welding ferrous metals.
- Explain the purpose of the electrode in GTAW and tell how this differs from other types of welding.
- Properly select shielding gases and filler metals for GTAW.
- Outline GTAW procedures, including welding preparation.
- Explain the concepts of resistance spot welding and resistance seam welding.
- Define flash welding, upset welding, and percussion welding, and tell how they differ.
- Tell how submerged arc welding and plasma arc welding differ from other arc welding methods.
- Describe the three forms of friction welding.

- Name two advantages of ultrasonic welding.
- Describe the effects of unequal or rapid heating and cooling on base metals and weld beads.
- List the advantages of GTAW over other welding processes.
- Describe the equipment and supplies needed for GTAW.
- Give examples of several kinds of electrode coverings and tell when each is used.
- Define arc length and explain its importance.
- Explain how the metal arc welding process works.
- Tell what provides the shield in shielded metal arc welding.
- List factors to consider when selecting an electrode.
- Describe the personal protective equipment necessary for welding.
- List the factors involved in selecting SMAW electrodes.
- Explain how to identify different welding electrodes.

WorkForge

WELDING SKILLS COURSES

WEL-2001 Introduction to Welding

- Identify joints and associated weld types
- List the basic arc welding process
- Identify weld discontinuities
- Understand weld and welding symbols

WEL-2003 Welding and Welding Discontinuities

- Identify weld joints and weld types
- Understand welding symbols
- Describe arc welding processes
- Recognize weld discontinuities
- Explain the basic welding process

WEL-2004 Welding Basics

- Explain how welding affects metallurgy
- Describe three AWS-recognized welding processes
- List the different welding positions
- Describe the fillet welds and butt welds
- Explain the basic joint types

- Define welding

WEL-2005 Welding Defects

- Understand the importance of detecting weld defects
- List testing techniques used to identify weld defects
- Describe what can be done to prevent many weld defects
- Explain the difference between fabrication-related and service-related defects
- Describe the different types of fabrication-related defects
- Define weld defects

WEL-2006 Arc Welding Safety

- Know who establishes the safety guidelines you should follow
- Understand arc welding hazards
- Describe ways to increase safety

WEL-2007 Elements of an Arc Welding Circuit

- Explain the elements of an arc welding circuit
- Describe types of power supplies
- Describe types of power supply outputs
- Explain the difference between constant voltage and constant current power supplies
- Define duty cycle rating

WEL-2008 Shielding

- Define shielding
- Understand why shielding is used
- Describe flux shielding
- Describe gas shielding

WEL-2009 Arc Welding Parameters

- List the main operating parameters that apply to arc welding
- Explain each operating parameter and how it affects arc welding
- Describe the three types of electrical polarity

WEL-2010 Gas Metal Arc Welding (GMAW)

- Describe the process of GMAW
- List common applications for GMAW
- Explain the advantages and limitations of GMAW

- Describe the four modes of metal transfer
- Understand process-specific information and variables

WEL-2011 Flux Core Arc Welding (FCAW)

- Describe the process of FCAW
- List common applications for FCAW
- Explain the advantages and limitations of FCAW
- Describe the modes of metal transfer
- Understand process-specific information and variables

WEL-2012 Gas Tungsten Arc Welding (GTAW)

- Describe the process of GTAW
- List common applications for GTAW
- Explain the advantages and limitations of GTAW
- Understand process-specific information and variables

WEL-2013 Plasma Arc Welding (PAW)

- Describe the process of PAW
- List common applications for PAW
- Explain the advantages and limitations of PAW
- Understand process-specific information and variables

WEL-2014 Shielded Metal Arc Welding (SMAW)

- Describe the process of SMAW
- List common applications for SMAW
- Explain the advantages and limitations of SMAW
- Understand process-specific information and variables

WEL-2015 Submerged Arc Welding (SAW)

- Describe the process of SAW
- List common applications for SAW
- Explain the advantages and limitations of SAW
- Understand process-specific information and variables

WEL-2016 Electroslag Welding (ESW) and Electrogas Welding (EGW)

- Describe the processes of ESW and EGW
- list common applications for ESW and EGW

- Explain the advantages and limitations of ESW and EGW
- Understand process-specific information and variables

xennialdigital user

VR Intro to Construction

VR Intro to Construction

- Learn vital elements of a safe worksite and practice equipping safety gear
- Identify and practice using basic standard power tools in VR
- Become familiar with fractions of an inch and begin practicing how to measure
- Explore common math functions required by specific trades in construction
- Explore basic standard materials of the trades and learn their intended uses
- Identify basic standard hand tools and practice using them in virtual reality
- Learn about and roleplay the different employment opportunities in the construction industry

Arts, A/V Technology & Communications

GoSkills

Photoshop for Beginners

PSD for Begin: 01 Beginners Module

- Understand The Swatches Panel
- Understand Mask, Don't Erase
- Understand Custom Shapes
- Understand Magic Wand vs Quick Selection
- Understand Bird's Eye View
- Understand Removing Backgrounds
- Understand Shape Strokes
- Understand History States
- Understand Layer Styles on Groups
- Understand Clipping Masks vs Layer Masks

PSD for Begin: 02 Photo Editing ? Part 1

- Understand Changing Skies with Blend If

- Understand Patch Tool Content Aware
- Understand Color Splash Effect
- Understand Brown to Blue Eyes
- Understand Brighten Teeth
- Understand Old, Cracked Photo Effect
- Understand Clone Yourself
- Understand Photographic Toning
- Understand Vibrance vs Saturation

PSD for Begin: 03 Mastering the Tools

- Understand Non-Destructive Burning, Dodging
- Understand Creating Custom Brushes
- Understand The Ruler Tool
- Understand The Crop Tool
- Understand Content-Aware Move
- Understand Blur Gallery

PSD for Begin: 04 Start Designing

- Understand Tileable Textures
- Understand Create a Web Search Bar
- Understand Create a Cloud Icon
- Understand Old Paper Effect
- Understand Puffy Clouds
- Understand Create a Rough Ticket Icon
- Understand Create a Wood Texture

PSD for Begin: 05 Text Effects ☐ Part 1

- Understand Candy Cane Text Effect
- Understand Snow Covered Text Effect
- Understand Neon Text Effect
- Understand Gold 'Bling' Text Effect
- Understand Editing Multiple Type Layers

PSD for Begin: 06 Photo Editing ☐ Part 2

- Understand Color Range Changes
- Understand Oil Paint Filter

- Understand Perspective Cropping
- Understand Replacing the Sky
- Understand Turn a Photo into a Painting
- Understand 1950's Style Pin-Up Poster
- Understand Mystical Mountain Photo Composition
- Understand Turn Day to Night
- Understand Create Smoke on Your Photos
- Understand Colorize a Black and White Photo
- Understand Carve a Heart into Snow
- Understand Create a Winter Wonderland

PSD for Begin: 07 Design 2 Part 2

- Understand Bokeh Effect
- Understand iOS7 Photo Icons
- Understand Create a Realistic Wax Seal
- Understand Create Abstract Fireworks

PSD for Begin: 08 Text Effects 2 Part 2

- Understand Harry Potter Text Effect
- Understand Chocolate Text Effect
- Understand Frozen Text Effect
- Understand Iron Man Text Effect
- Understand Modern Warfare 3 Text Effect

PSD for Begin: 09 Final Exam

- Completion

Open Textbooks

Adaptive Apparel Design

Adaptive Apparel Design

- Identify the key types of research involved in adaptive apparel design, including market analysis, consumer research, and materials research
- Explain the importance of market analysis in understanding the adaptive apparel market, including its history, major brands, and existing product categories

- Describe how consumer research helps designers understand the needs and preferences of potential users of adaptive apparel
- Discuss the role of materials research in selecting appropriate textiles and notions for adaptive apparel, considering factors like sensory comfort and ease of use
- Understand the importance of person-first language and effective communication techniques when interacting with clients with disabilities in the adaptive apparel design process
- Understand how to formulate strategies for conducting consumer research within the disabled community, including considerations for pre-meeting preparations, accessible meeting spaces, and respectful interview techniques
- Understand various textile properties (e.g., thermal protection, comfort, easy care, breathability) and their relevance when selecting appropriate materials for specific adaptive apparel needs
- Articulate key design adaptations (e.g., magnetic closures, adjustable openings, sensory comfort features) and their practical application in addressing diverse functional dressing challenges faced by individuals with disabilities
- Explain the role of sketching as a method for developing numerous apparel design concepts, emphasizing its importance in translating research into visual solutions
- Understand the importance of sketching tools such as croquis and tracing paper to generate design ideas while maintaining accurate human body proportions
- Understand the role specialized fashion illustration templates of bodies with disabilities play in informing and guiding the development of inclusive adaptive apparel sketches that address specific functional needs
- Explain the purpose and benefits of creating a sample notebook in the adaptive apparel design process, including its role in validating patternmaking and construction techniques and facilitating team collaboration
- Understand the value of a sourcing guide to identify and acquire appropriate notions and materials for adaptive clothing samples, considering specific functional and sensory needs
- Explain the function and significance of a mood or inspiration board as a visual guide in the adaptive apparel design process, facilitating design refinement and focus
- Understand patternmaking techniques to create adaptive apparel patterns that address the specific needs and challenges of individuals with disabilities

- Identify effective methods for obtaining accurate body measurements, including considerations for seated individuals and the use of 3D scanning, to ensure proper fit and comfort
- Understand the importance of design adaptations (e.g., easier openings, sensory comfort, storage solutions) in patternwork to enhance the functionality and wearability of adaptive garments
- Explain the purpose and value of developing a first sample in adaptive apparel design, including its role in evaluating patterns, construction, fabrics, and notions
- Identify specific construction techniques for adaptive apparel like low-profile seams for sensory comfort or durable seams for increased strain
- Understand how to conduct effective fit sessions for adaptive apparel, utilizing best practices for space, time, assistance, and communication
- Understand how to evaluate garment fit based on comfort, mobility, and interaction with medical equipment
- Understand the importance of various user feedback collection methods, such as wear testing, interviews, surveys and focus groups, to gather valuable insights on the functionality and user experience of the completed adaptive apparel design

Audio Production

Audio Production: Unit 1

- Explain the fundamental principles of sound waves
- Describe the function and key characteristics of microphones as transducers
- Identify and differentiate between various microphone polar patterns and their practical applications
- Identify the fundamental purpose and diverse applications of a mixing console
- Explain the primary functions and controls found on a mixing console beyond simple volume
- Recognize and describe the individual sections and controls of a typical channel strip
- Differentiate between various signal monitoring and routing techniques
- Compare and contrast analog and digital mixing consoles
- Prioritize and apply essential safety practices in audio production setups
- Differentiate between various types of audio cables and connectors, and apply best practices for their organization and use
- Explain the fundamental principles of loudspeaker operation and identify the components of a multi-driver speaker system

- Select appropriate speakers for a given audio scenario based on key specifications and situational factors
- Identify and describe the various types of microphone stands and their essential accessories for optimal microphone placement and isolation
- Apply general principles of microphone placement and selection to achieve desired sound quality for various sources
- Utilize close miking techniques and the 3:1 rule to manage signal isolation and phase coherence
- Implement specific microphone placement strategies for a variety of common instruments and vocals
- Differentiate and apply various stereo microphone techniques (X-Y, A-B, ORTF, Mid/Side) for specific recording outcomes
- Perform a basic live sound check and apply fundamental equalization (EQ) principles to common instruments and vocals

Audio Production: Unit 2

- Understand the evolution of audio recording technology across eras
- Identify key inventions and their impact on audio production and consumption
- Recognize the interplay between technological advancements and artistic/performance adaptations
- Understand the development and impact of magnetic recording technologies
- Understand the principles and applications of multitrack recording
- Understand the fundamental role and components of a Digital Audio Workstation (DAW)
- Navigate and utilize the core interface and tools within Pro Tools (or any DAW)
- Understand basic audio track management and editing techniques
- Understand essential audio mixing processes to enhance and balance sound
- Understand best practices for session preparation and final mix bouncing
- Differentiate between lossless and lossy digital audio file formats
- Identify and characterize common digital audio file formats
- Understand the conversion process between analog and digital audio files
- Recognize and describe various analog audio recording media
- Understand how to apply technical knowledge and methodological approaches to audio file management
- Define and explain the purpose of audio mastering within the production workflow

- Identify key processes and considerations involved in the mastering stage
- Determine when and why mastering is essential for an audio project

Audio Production: Unit 3

- Understand the dual role of an Audio Engineer
- Understand pre-session communication and expectation setting
- Understand how to cultivate a supportive and enthusiastic studio environment
- Differentiate between soundproofing and acoustic treatment and understand their respective goals
- Identify and apply key principles of sound reduction and acoustic control
- Recognize the importance of methodical application and technical knowledge in studio acoustics
- Understand how to prioritize safety, budget, and vision in home studio design
- Recognize the evolution and accessibility of home recording
- Grasp the foundational components and acoustical principles of a recording studio

Digital Media Production

Digital Media Production - Unit 04 - Advanced Visual Techniques

- Demonstrate basic principles of digital compositing.
- Explain blending modes in compositing and identify the types of blending modes available.
- Describe various types of ideation and research methodologies for engaging in creative work.
- Demonstrate the use of various ideation methodologies for engaging in creative work.
- Explain the importance of and demonstrate file management skills.
- Describe the procedures involved with file conversion, importing, exporting, and transcoding.
- Apply basic principles of editing digital imagery.
- Demonstrate using the histogram and levels tools on digital imagery.

Digital Media Production - Unit 01 - Digital Media Foundations

- Explain the basic principles of electromagnetic radiation, particularly the visible light spectrum, and describe how human vision perceives color and light in the context of digital media production.
- Explain how color theory is used to select and mix colors in the visual arts.

- Demonstrate knowledge of aperture and depth of field in digital photography and videography.
- Demonstrate knowledge of shutter speed and motion blur in digital photography and videography.
- Demonstrate knowledge of light sensitivity (ISO) in digital photography and videography.
- Demonstrate knowledge of pixels, resolution, and aspect ratio in digital photography and videography.
- Demonstrate knowledge of color gamut, color depth, and dynamic range in digital photography and videography.
- Demonstrate basic technical principles of working with digital imagery and define common terminology.
- Identify various types of interactive media applications, including emerging technology
- Explain the difference between digital and analog signals.
- Define visual, auditory, and interactive media terminology, including those related to web-based, video, and audio projects.
- Identify and explain input devices used in digital media production
- Identify and explain output devices used in digital media production
- Demonstrate knowledge of how computers work and identify common hardware terminology.
- Correctly use and present various formats of media files.

Digital Media Production - Unit 02 - Digital Video and Graphics

- Explain the basic concepts of how digital video cameras work and common digital videography terminology.
- Demonstrate the basic principles of working with digital video and define common terminology.
- Explain the relationship between frame rate and shutter angle and how to choose the appropriate shutter speed for a given frame rate.
- Demonstrate knowledge of how computer graphics and displays work and identify proper terminology such as bitmap, display buffer, color sample, pixels, vector, and rasterization.
- Explain the basic concepts of how graphic design programs are used for assembling layouts.
- Explain the basic concepts of how illustration programs are used for generating drawings and digital artwork.

- Demonstrate basic principles of 3D graphics and define common 3D graphics terminology.
- Demonstrate basic principles of interactive media and define common interactive media terminology.
- Demonstrate basic principles of animation and define common animation terminology.
- Explain the basic principles of sound waves, particularly within audible frequencies, and describe how human hearing perceives audio in the context of digital media production.
- Explain the basic concepts of how digital audio interfaces and recorders work and common digital audio terminology.
- Identify the fundamentals of recording or live-streaming digital audio.
- Demonstrate the basic principles of working with digital audio and define common terminology.

Digital Media Production - Unit 03 - Design Fundamentals and Planning

- Define creativity and explain the nature of the creative process.
- Define and use the principles of design (e.g., emphasis, contrast, balance, hierarchy, repetition, rhythm, unity, proportion, movement, variety, alignment, and spacing).
- Define and use the elements of design (e.g., line, space, shape, texture, form, value, and color).
- Identify design specifications based on customer requirements.
- Apply elements of a successful layout, including communication, organization, and appeal.
- Apply knowledge of wireframes, thumbnails, storyboards, mockups, and animatics.
- Contrast the elements of rough and final art.
- Demonstrate knowledge of basic video editing techniques and procedures.
- Apply knowledge of design principles to balance pacing and transitions in time-based media.
- Identify and define key video production terminology.
- Identify and demonstrate knowledge of the fundamentals of video production.
- Apply appropriate video production techniques for the rendering output process, including formats and codecs.

Digital Media Production - Unit 05 - Color Theory and Applications

- Apply basic principles of color, including primary, secondary, and tertiary colors.
- Explain and apply additive and subtractive color principles.

- Identify characteristics of color (e.g., tint, hue, saturation, shade, and brightness).
- Explain the concept of color temperature and how to appropriately set the camera's white balance for the lighting conditions.
- Use the psychology of color to select appropriate colors.
- Identify digital display technologies and how digital displays create visual representations of digital imagery.
- Demonstrate a working knowledge of lighting fundamentals for videography, photography, and computer-generated graphics, including 3D computer animation.
- Demonstrate a working knowledge of lighting both the subject and the green or blue backdrop for chromakeying applications.
- Demonstrate how to generate masks for images and videos based on color information, then apply layer compositing processes to combine it with other visual elements.
- Apply audio engineering techniques for the capture and manipulation of sound waves.
- Identify the different types of microphones and explain their ideal primary use cases based on their properties.
- Shape sound with hardware and software devices inserted into the signal path.

Digital Media Production - Unit 06 - Typography and Web Design

- Demonstrate knowledge of typographic terminology.
- Identify the characteristics of type styles and families.
- Explain the anatomy of type.
- Demonstrate the basic principles of semantic document structure, including the Document Object Model (DOM).
- Explain using styles in web design and style rules in document creation software.
- Explain how web-based projects are developed and deployed.
- Investigate the key factors that help streamline projects and implement proven strategies for reducing waste and risk.
- Describe the advantages and process of using custom and pre-configured design templates.
- Choose and apply the appropriate typeface for various jobs.
- Explain and appropriately use various units of measurement regarding font size, padding, and margin.
- Diagnose typography design problems in properties such as kerning, tracking, and leading.

Digital Media Production - Unit 07 - Digital Marketing and Media Regulations

- Investigate ways to promote a new product, service, or event through digital media.
- Explain the importance of search engine optimization (SEO) and its fundamental concepts.
- Demonstrate awareness of governmental and industrial regulations.
- Identify personal and professional issues of cyber safety and online confidentiality.
- Demonstrate knowledge of the Internet and its uses.
- Explain how adopting a thoughtful protocol for professional etiquette strengthens connections and builds confidence.
- Identify ways visual communication and interactive media design can be used in business.
- Display knowledge of how to recognize problems, identify their root causes, and discover potential solutions through a continuous process of trial and error.

Digital Media Production - Unit 08 - Communication and Workflow

- Identify key strategies for effective and efficient communication.
- Evaluate the effectiveness of visual communications and interactive media design using feedback and criticism.
- Describe each part of the creative process and effective organizational methodology to employ when working creatively.
- Communicate, interact, and work effectively with individuals and groups using verbal and nonverbal communication.
- Consider how framing, composition, lighting, camera angles, camera motion, scene layout, and planning contribute to visual storytelling.
- Describe the properties of lenses and the rationale for selecting different lenses.
- Identify and describe the different types of physical and digital filters used to adjust visuals.
- Identify and describe the basic types of camera angles used to visually narrate and shape the viewer's perspective of a shot.
- Identify and describe the basic camera movements used to visually narrate and shape the viewer's perspective of a shot.
- Demonstrate the use of gimbals and motion control rigs.

Digital Media Production - Unit 09 - Color, Branding, and Production

- Apply post-production image processing techniques to adjust and enhance the appearance of captured images and footage.

- Describe the fundamentals of working with color palettes.
- Utilize gradients to apply continuous color.
- Identify and use proofreading marks.
- Proof documents and other projects before printing.
- Identify how social media marketing impacts the industry and describe how branding and identity establish recognition.
- Identify and describe career options and emerging trends in visual communication and interactive media.
- Apply basic principles and techniques for designing and producing motion graphics.
- Apply basic principles and techniques for designing and producing title sequences.

Digital Media Production - Unit 10 - Professional Practice and Career Development

- Identify and explain industry standard development, production, and work management frameworks.
- Describe the options available for contracts and reimbursement.
- Apply appropriate office safety practices, electrical safety practices, and chemical safety practices.
- Identify legal and ethical responsibilities for digital content creators.
- Explain the purpose of digital rights management and various DRM protection measures.
- Identify the educational requirements for various visual communications and interactive media design careers.
- Identify the elements of a professional portfolio for the visual communications and interactive media design field.
- Apply appropriate use of educational resources.
- Apply appropriate use of reference materials.

Digital Media Production - Unit APPLY Activities

- Completion

Intro to Music Composition & Digital Audio Production

Intro to Music Comp & DIA: 02 Digital Audio

- Understand the basics of digital audio conversion
- Define key digital audio properties
- Recognize common digital audio file formats and compression methods

Intro to Music Comp & DIA: 03 MIDI Overview

- Define MIDI and its function
- Differentiate MIDI from digital audio
- Recognize the components and applications of MIDI

Intro to Music Comp & DIA: 04 General MIDI & MIDI Messages

- Understand the purpose of general MIDI (GM)
- Describe MIDI connections and channels
- Recognize key MIDI messages and their functions

Intro to Music Comp & DIA: 05 MIDI Extras (Advanced)

- Understand the function of control change (CC) messages
- Explain the role of Bank Select messages
- Recognize the purpose of System Exclusive (SysEx) messages

Intro to Music Comp & DIA: 06 Music as a Temporal Art

- Define music as a temporal art
- Recognize the role of experience and knowledge in musical meaning
- Differentiate between musical style and genre

Intro to Music Comp & DIA: 07 Music & Aesthetics

- Understand the nature of an aesthetic experience
- Differentiate the four approaches to perceiving music (technical, practical, religious, aesthetic)
- Recognize the three main theories of musical aesthetics: Referentialism, Formalism and Absolute Expressionism

Intro to Music Comp & DIA: 08 Acoustics & Perception

- Understand the role of auditory illusions in perception
- Describe how the brain processes melody
- Recognize the Impact of experience on musical meaning

Intro to Music Comp & DIA: 09 Elements of Music Overview

- Understand the core elements of music
- Define timbre and its acoustic properties
- Recognize the relationship between melody, harmony, and rhythm

Intro to Music Comp & DIA: 10 The Creative Process 1

- Understand problem-solving as a creative starting point
- Recognize starting points in musical elements and style
- Connect extramusical ideas to musical structure (the Story Spine)

Intro to Music Comp & DIA: 12 The Creative Process 3

- Recognize the components of a completed musical piece
- Learn to use pre-planning and self-evaluation in composition
- Understand a systematic approach to musical composition

Intro to Music Comp & DIA: 13 Creative Process 4

- Understand the parallels between musical and visual arts
- Recognize how rhythm and time connect music and visuals
- Learn to use musical elements to highlight visuals

Intro to Music Comp & DIA: 01 Sound in the Real & Digital World

- Define sound as a vibration that travels through a medium, such as air, as a wave
- Describe the role of wave interaction in sound
- Recognize real-world applications of sound principles

Intro to Music Comp & DIA: 11 The Creative Process 2

- Develop musical ideas with repetition and contrast
- Utilize quantization and transposition to refine your music
- Recognize musical problems and solutions in a song's structure

Video Production Basics DIY Guide

Video Production Basics DIY Guide - Ch 01: Production Planning

- Identify the five critical factors (Audience, Purpose, Key Message, Delivery, and Outcomes) that guide the development phase of video production.
- Understand the purpose and basic structure of production documents including synopses, treatments, scripts, and storyboards.
- Recognize the importance of location scouting and identify key considerations when evaluating potential filming locations.
- Create basic pre-production checklists for equipment, scheduling, and logistics.
- Anticipate common pre-production challenges such as wardrobe considerations, permissions, and scheduling requirements.

- Apply a structured approach to planning video productions from concept through pre-production.

Video Production Basics DIY Guide - Ch 02: Production

- Explain the function and positioning of Key, Fill, and Backlight in a standard lighting setup
- Set up a basic 3 point lighting system using available resources
- Utilize basic lighting adjustments to address common lighting challenges
- Adjust the relative brightness of lights to create appropriate mood and dimension
- Select and position microphones appropriately to capture clear audio
- Minimize unwanted ambient noise through proper microphone placement and environmental control
- Monitor audio levels to ensure quality recording without distortion
- Position camera and interviewer to create natural eye lines and well-composed shots
- Prepare and guide interviewees to provide self-contained responses usable in editing
- Conduct interviews with appropriate pacing to create engaging content and editing flexibility
- Select appropriate resolution and frame rate based on project requirements and storage considerations
- Configure a smartphone or tablet camera for optimal video recording quality
- Apply basic techniques to maintain stable footage and avoid common technical issues
- Apply the Rule of Thirds to create visually balanced and engaging shots
- Utilize different camera angles to create specific emotional effects or visual interest
- Select appropriate shot sizes to effectively communicate your intended message
- Recognize the differences between natural and artificial light sources and their impact on video quality
- Implement techniques to create even, flattering lighting for subjects

Video Production Basics DIY Guide - Ch 03: Post Production

- Identify the basic editing capabilities of Panopto for trimming video footage
- Demonstrate how to use Panopto's interactive features such as discussions, quizzes, and embedded videos
- Integrate a table of contents and Smart Chapters to enhance video navigation
- Apply Panopto's interactive tools to transform one-way presentations into engaging learning experiences

- Compare and contrast different video editing software options (Microsoft Clipchamp, Apple iMovie, OpenShot, and Blackmagic DaVinci Resolve)
- Differentiate between basic and advanced editing features across various software platforms
- Identify the appropriate video editing software based on specific project requirements
- Recognize which editing software has been approved by USask ICT for institutional use
- Apply proper organization techniques to manage media files before editing
- Construct a rough cut that effectively communicates the intended message
- Analyze and implement appropriate pacing choices based on content type
- Develop a fine cut with frame-level precision that creates a polished final product
- Evaluate the impact of pacing on viewer engagement and emotional response
- Select appropriate export settings based on target delivery platforms
- Identify the optimal format, resolution, and aspect ratio requirements for different social media platforms
- Configure proper bitrate and encoding settings for optimal video quality
- Compare file size limitations and video length restrictions across various platforms
- Adapt export parameters to meet the specific requirements of platforms such as YouTube, Facebook, Instagram, Twitter, and TikTok

Video Production Basics DIY Guide - Ch 04: Distribution

- Explain the primary benefits of using Panopto as a media streaming platform for educational content.
- Demonstrate the process of uploading videos to Panopto and embedding them in websites or Canvas courses.
- Apply the correct sequence of steps for integrating Panopto videos into a Canvas course environment.
- Explain how Panopto and Canvas work together to manage student access permissions.

Video Production Basics DIY Guide - Ch 05: Media Production - DIY Facilities, Training and Support Services

- Describe the key features and purposes of the UCreate Studio and Lightboard Studio facilities.
- Identify who can access the DIY studio facilities and how to book them.
- Explain the types of workshops offered by Media Production and what skills they develop.

- Recognize how Media Consultation services can support faculty and staff with media projects.
- Understand how student training in media production supports digital competency development.

Pointful Education

Adobe After Effects

Adobe After Effects 00: Start Here

- Completion

Adobe After Effects 01: Working in the Visual Effects and Motion Graphics Industry Part I

- Identify legal and ethical considerations for using third-party content
- Identify when and how to obtain permissions to use images, audio, or footage
- Determine whether content is relevant to the purpose, the audience, and their needs
- Identify requirements based on how the video will be delivered, distributed, and/or consumed
- Demonstrate knowledge of techniques for communicating ideas about project plans with peers and clients
- Demonstrate knowledge of basic project management concepts

Adobe After Effects 02: Working in the Visual Effects and Motion Graphics Industry Part II

- Demonstrate knowledge of digital video and audio terminology
- Demonstrate knowledge of how color is represented in digital video
- Understand and use key terms related to video and audio postproduction
- Demonstrate knowledge of common animation terms and principles
- Demonstrate knowledge of standard compositing techniques
- Define common cinematic composition terms and principles
- Identify general design principles and guidelines for motion graphics

Adobe After Effects 03: Project Setup and Interface

- Choose appropriate project settings to meet requirements
- Create and modify compositions to match the delivery requirements
- Identify, navigate, and manipulate elements of the After Effects interface, including workspaces, application preferences, timeline and media, markers, guides, and grids
- Import media from various sources
- Manage assets/footage in an After Effects project

Adobe After Effects 04: Organizing Projects

- Recognize the different types of layers in the Timeline panel
- Use the Timeline panel to manage layers
- Manage multiple layers in a complex composition
- Adjust a layer's visibility
- Create, apply, and manipulate masks and track mattes

Adobe After Effects 05: Creating and Modifying Visual Elements Part I

- Transform visual elements in the composition
- Create visual elements using a variety of tools
- Place assets into a composition
- Create text in a composition
- Adjust paragraph settings
- Animate text
- Adjust layers using a variety of tools

Adobe After Effects 06: Creating and Modifying Visual Elements Part II

- Change the speed of a video clip
- Use basic auto-correction methods and tools
- Apply and adjust a video effect or preset to a layer
- Use 3D space to modify composition elements
- Create composites
- Apply and modify effects and presets on multiple layers
- Apply and adjust transformations using keyframes
- Animate effects using keyframes

Adobe After Effects 07: Publishing Digital Media

- Archive a project
- Export frames
- Export a composition
- Prepare for the Adobe Certified Professional Exam
- Check a composition for errors and verify specifications

Adobe After Effects 08: Course Wrap-up/Final Exam

- Completion

Adobe Illustrator Certification

Module 00: Adobe Illustrator

- Completion

Module 01: Working in the Design Industry

- Understand the Adobe Creative Suite and the role of the various applications.
- Identify the purpose, audience, and audience needs for preparing graphics and illustrations.
- Determine the type of copyright, project fit, permissions, and licensing to use specific content.
- Demonstrate knowledge of project management tasks and responsibilities.
- Communicate with colleagues and clients about design plans.

Module 02: Understanding Digital Graphics and Illustrations

- Navigate Adobe Illustrator
- Identify elements of the Illustrator CC user interface and demonstrate knowledge of their functions
- Define the functions of commonly used tools, including selection tools, the Pen tool, and other drawing tools, shape tools, and transformation tools.
- Navigate, organize, and customize the workspace
- Use non-printing, design tools in the interface, such as rulers, guides, bleeds, and artboards.

Module 03: Understanding Adobe Illustrator Part I

- Use non-printing, design tools in the interface, such as rulers, guides, bleeds, and artboards.
- Navigate, organize, and customize the workspace
- Define the functions of commonly used tools, including selection tools, the Pen tool, and other drawing tools, shape tools, and transformation tools.
- Identify elements of the Illustrator CC user interface and demonstrate knowledge of their functions
- Navigate Adobe Illustrator

Module 04: Understanding Adobe Illustrator Part II

- Use layers to manage design elements.
- Manage colors, swatches, and gradients.

- Manage brushes, symbols, graphic styles, and patterns.
- Demonstrate knowledge of how and why illustrators employ different views and modes throughout the course of a project including vector/outline vs. display/appearance, isolation mode, and various Draw modes.
- Demonstrate and understanding of vector drawing tools.

Module 05: Creating Digital Graphics and Illustrations Using Adobe Illustrator Part I

- Create a new project
- Use vector drawing tools
- Use shape tools
- Transform graphics and illustrations
- Use basic reconstructing and editing techniques to manipulate digital graphics and media

Module 06: Creating Digital Graphics and Illustrations Using Adobe Illustrator Part II

- Demonstrate knowledge of layers and masks.
- Import assets into a project.
- Add and manipulate type using Type tools.
- Create digital graphics and illustrations using 3D and perspective tools in Illustrator.

Module 07: Archive, Export, and Publish Graphics Using Adobe Illustrator

- Prepare images for web, print, and video.
- Export digital graphics and illustration to various file formats.
- Understand the structure and test prep necessary for the ACA Illustrator Certification Exam.

Module 08: Course Wrap-up/Final Exam

- Completion

Adobe InDesign Certification

AID Module 00: Start Here

- Completion

AID Module 01: Working in the Design Industry Part I

- Understand the Adobe Creative Suite and the role of the various applications.
- Determine whether the content is relevant to the purpose, audience, and audience needs.

- Demonstrate knowledge of techniques for communicating about design plans with peers and clients.
- Determine the type of copyright permissions and licensing required to use specific content.
- Determine the type of copyright permissions and licensing required to use specific content.

AID Module 02: Working in the Design Industry Part II

- Demonstrate knowledge and understanding of key terms related to publication and multi-page layouts.
- Demonstrate knowledge of how color is created in publications.
- Demonstrate knowledge of elements and principles of design and common design techniques.
- Identify and use common typographic adjustments to create contrast, hierarchy, and enhanced readability.
- Define common photographic/cinematic composition terms and principles.

AID Module 03: Project Setup and Interface Part I

- Create a document with appropriate settings for web, print, and mobile.
- Identify and manipulate elements of the InDesign interface.
- Navigate, organize, and customize the application workspace.
- Navigate a document.
- Use rulers, grids, guides, views, and modes to work efficiently.

AID Module 04: Project Setup and Interface Part II

- Import assets into a project.
- Manage colors, swatches, and swatch libraries.
- Create and customize gradients.

AID Module 05: Organizing Documents

- Use the Layers panel to modify layers.
- Employ best practices to effectively manage multiple layers and complex projects.
- Modify layer visibility and printability.
- Create pages in a document.
- Edit and customize pages.

AID Module 06: Creating and Modifying Visual Elements Part I

- Use core tools and features to lay out visual elements.
- Use a variety of type tools to add typography to a design.
- Use appropriate character and paragraph settings in a design.
- Convert text to graphics and manage text flow across multiple text areas.
- Use tools to add special characters or content.

AID Module 07: Creating and Modifying Visual Elements Part II

- Make selections using a variety of tools.
- Modify and refine selections using various methods.
- Modify frames and frame content.
- Rotate, flip, and transform individual frames or content.

AID Module 08: Creating and Modifying Visual Elements Part III

- Use various tools and auto-correction methods to repair project content.
- Use the Story Editor to edit the text within a project.
- Use effects to modify images or frames.
- Create, edit, and save object styles.

AID Module 09: Creating and Modifying Visual Elements Part IV

- Add interactive elements and behaviors.
- Demonstrate knowledge of how to embed rich-media objects.
- Identify and assign triggers for multimedia assets.
- Create a table to display data.
- Edit tables and cells.

AID Module 10: Publishing Digital Media

- Save in appropriate formats for print or screen.
- Prepare documents for publishing to the web, print, and other digital devices.
- Save in the native file format for InDesign (.indd).
- Understand the structure and test prep necessary for the ACA InDesign Certification Exam.
- Print proof copies before publishing.
- Package an InDesign project.

AID Module 11: Course Wrap-up/Final

- Completion

Adobe Photoshop Certification

APC 00: Module 0 - Start Here

- Completion

APC 01: Working in the Design Industry Part I

- Understand the Adobe Creative Cloud and the role of the various applications
- Determine whether the content is relevant to the purpose, audience, and audience needs
- Demonstrate knowledge of techniques for communicating about design plans with peers and clients
- Demonstrate knowledge of basic project management concepts
- Identify legal and ethical considerations for using third-party content, such as copyright, permissions, and licensing
- Identify when and how to obtain permission to use images of people and locations

APC 02: Working in the Design Industry Part II

- Demonstrate knowledge of digital image terminology
- Demonstrate knowledge of how color is created in digital images
- Communicate visually using the elements and principles of design and common design techniques
- Identify and use common typographic adjustments to create contrast, hierarchy, and enhanced readability/legibility
- Demonstrate knowledge of common photographic/cinematic composition terms and principles

APC 03: Project Setup and Interface Part I

- Set appropriate document settings for printed and onscreen images
- Create a new document preset to reuse for specific project needs
- Identify and manipulate elements of the Photoshop interface
- Organize and customize the workspace
- Configure application preferences

APC 04: Project Setup and Interface Part II

- Navigate a document
- Use rulers
- Use guides and grids

- Open or import images from various devices
- Place assets in a Photoshop document and use the Adobe Camera Raw interface to process images

APC 05: Project Setup and Interface Part III

- Set the active foreground and background color
- Create and customize gradients
- Create and edit swatches
- Open and browse libraries of included brushes, symbols, graphic styles, and patterns
- Create and edit brushes, symbols, styles, and patterns

APC 06: Organizing Documents Part I

- Recognize the different types of layers in the Layers panel
- Flatten and merge layers
- Use the Layers panel to modify layers
- Manage layers in a complex project
- Work with multiple layers

APC 07: Organizing Documents Part II

- Adjust a layer's opacity, blending mode, and fill opacity
- Create, apply, and manipulate masks
- Nondestructive editing: Smart Objects, Smart Filters, and adjustment layers
- Organize a document based on various specifications
- Destructive editing: painting, adjustments, erasing, and rasterizing

APC 08: Creating and Modifying Visual Elements Part I

- Create images using a variety of tools
- Modify and edit vector images using a variety of vector tools
- Use type tools to add typography to a design
- Adjust character settings in a design
- Adjust paragraph settings in a design, and convert text to graphics

APC 09: Creating and Modifying Visual Elements Part II

- Make selections using a variety of tools
- Modify and refine selections using various methods and save and load selections
- Modify the canvas or artboards

- Rotate, flip, and modify individual layers, objects, selections, groups, or graphical elements
- Apply basic auto-correction methods and tools

APC 10: Creating and Modifying Visual Elements Part III

- Use various tools to repair and reconstruct images
- Evaluate or adjust the appearance of objects, selections, or layers using various tools
- Apply photographic changes to images using tools and adjustments
- Use filters to modify images destructively or non-destructively
- Apply, modify, copy, and remove layer styles as well as create, manage, and save custom layer styles

APC 11: Publishing Digital Media

- Check the document for errors and project specifications.
- Save in the native file format for Photoshop (.psd).
- Save documents in appropriate image formats for print or screen.
- Export project elements.
- Understand the structure and test prep necessary for the ACA Photoshop Certification Exam.

APC 12: Course Wrap-up/Final Exam

- Completion

Adobe Premiere Certification

APC 01: Working in the Video Industry Part I

- Identify the purpose, audience, and audience needs for preparing images and determine whether the content is relevant to the purpose, audience, and audience needs.
- Communicate with colleagues and clients about design plans demonstrating knowledge of techniques for communicating about design plans with peers and clients.
- Demonstrate knowledge of basic project management concepts.
- Determine the type of copyright, permissions, and licensing required to use specific content identifying legal and ethical considerations for using third-party content, such as copyright, permissions, and licensing.

APC 02: Working in the Video Industry Part II

- Demonstrate knowledge of key terminology related to digital audio, digital video, and video/audio production.
- Demonstrate knowledge of how color is managed in digital video.
- Communicate visually using design principles and standard film/video techniques.
- Identify general design principles and guidelines for editing video.
- Define common photographic and cinematic composition terms and principles and give examples of when and why to use types of shots.

APC 03: Project Setup and Interface

- Set appropriate project settings for video and identify and manipulate elements of the Premiere Pro interface.
- Navigate, organize, and customize the application workspace and configure application preferences.
- Import assets into a project, import media from various sources, and manage assets in a Premiere Pro project.
- Create a sequence that matches the project requirements.
- Use non-visible design tools in the interface to aid in video workflow including navigating a project, timeline markers, and guides.

APC 04: Organizing, Creating and Modifying Visual Elements Part I

- Use the Timeline panel to manage video and audio tracks.
- Modify basic track visibility and audio levels.
- Create a video rough-cut using a variety of tools and panels.
- Manage sequences in a complex project.
- Place images and video into a sequence.

APC 05: Organizing, Creating and Modifying Visual Elements Part II

- Trim footage for use in sequences including resizing clips using a variety of tools.
- Modify and refine clip trims using various methods.
- Modify clip settings and change the speed or direction of a video clip.
- Adjust the audio of a video clip.
- Add and animate titles and modify title properties including creating superimposed text and shapes in a video sequence, using appropriate character and paragraph settings in a title, and animating title elements.

APC 06: Organizing, Creating and Modifying Visual Elements Part III

- Use basic editing techniques and effect presets to manipulate digital audio and video including auto-correction methods and tools and audio and video effects presets.
- Apply and adjust effects presets on multiple clips in separate tracks by using adjustment layers.
- Apply and adjust video motion effects and composite video tracks.
- Use Effect Controls to modify video in a sequence including modifying video effect settings.
- Manage audio in a video sequence including adding audio to a sequence and adjusting the audio on the timeline or using the Effect Controls panel.

APC 07: Publishing Digital Media

- Check a project for errors and project specifications.
- Export and archive video and audio sequences including exporting a clip, range of frames, a single frame, or an entire sequence.
- Export using the Adobe Media Encoder.
- Archive a project.
- Understand the structure and test prep necessary for the Adobe Certified Professional credential.

APC 08: Final Exam

- Completion

Business Management & Administration

Core-LX

Microsoft Excel Associate Certification Prep

01 Excel Foundations

- Navigate the Excel interface and identify key components
- Create, open, save, and manage workbooks effectively
- Work with multiple worksheets and workbooks simultaneously
- Apply number formatting including currency, percentages, and dates
- Format cells using fonts, colors, borders, and alignment
- Understand and apply relative and absolute cell references

- Create basic formulas using SUM, AVERAGE, and COUNT functions
- Insert, delete, hide, and manage rows and columns
- Select and manipulate ranges efficiently using keyboard shortcuts
- Customize the Quick Access Toolbar and Ribbon for productivity

02 Data Management & Organization

- Sort data by single or multiple columns in ascending and descending order
- Apply and manage filters to display specific data
- Convert data ranges into Excel Tables and use table features
- Work with structured references in formulas
- Create and manage data validation rules with custom criteria
- Use Find & Replace with wildcards and advanced options
- Navigate large datasets using Go To and special selection tools
- Apply conditional formatting rules including highlight cells, data bars, and color scales
- Manage conditional formatting rules and understand rule priority
- Create dropdown lists and input messages for data entry

03 Essential Formulas & Functions

- Write IF statements to return different values based on conditions
- Combine multiple conditions using AND, OR, and nested IF functions
- Use VLOOKUP and XLOOKUP to find and retrieve data from tables
- Handle lookup errors with IFERROR and IFNA functions
- Calculate date differences and work with workdays using DATEDIF and NETWORKDAYS
- Use SUMIF, COUNTIF, and AVERAGEIF for conditional calculations
- Apply SUMIFS, COUNTIFS, and AVERAGEIFS with multiple criteria
- Combine text from multiple cells using CONCAT, TEXTJOIN, and text extraction functions
- Clean and manipulate text data with TRIM, UPPER, LOWER, and SUBSTITUTE
- Use TODAY, NOW, and extract date components with YEAR, MONTH, and DAY

04 Advanced Formulas & Functions

- Use named ranges in formulas to improve readability and maintainability
- Create dynamic named ranges and use named constants throughout workbooks
- Build and interpret nested functions step-by-step from inside out
- Combine IF with logical functions (AND, OR) for complex decisions
- Nest lookup functions with other calculations for advanced data retrieval

- Use text functions together for complex data transformation
- Identify and diagnose the seven common Excel error types
- Use IFERROR and IFNA to handle errors gracefully in formulas
- Apply Formula Auditing and Error Checking tools to trace and debug errors
- Create and manage named ranges using multiple methods

05 PivotTable Analysis

- Create PivotTables from raw data and understand the four field areas
- Rearrange and reorganize PivotTables to answer different questions
- Group date fields by months, quarters, and years
- Create calculated fields and calculated items for custom analysis
- Show values as percentages, differences, and running totals
- Insert and configure slicers for interactive filtering
- Create Timeline filters for date-based analysis
- Connect slicers to multiple PivotTables for dashboard functionality
- Prepare source data correctly and use Tables as PivotTable sources
- Apply PivotTable best practices including layout design and performance optimization

06 Data Visualization & Charts

- Identify which chart type best suits different data scenarios and purposes
- Create charts using multiple methods and customize chart styles and colors
- Format chart titles, axis labels, legends, and chart elements professionally
- Modify chart data ranges and switch between chart types after creation
- Create combo charts with multiple chart types and secondary axes
- Add and format trendlines to show patterns and forecast future values
- Create and customize sparklines for in-cell data visualization
- Use sparklines in dashboards and combine with conditional formatting
- Apply best practices for professional chart formatting and design
- Move, resize, and position charts effectively within worksheets

07 Professional Excel Features

- Adjust page orientation, margins, headers, footers, and print settings for professional output
- Define print areas, manage page breaks, and configure settings for multi-page worksheets
- Lock and unlock cells, protect worksheets and workbooks with passwords

- Configure advanced protection options to control formatting, sorting, and filtering
- Apply and customize document themes, cell styles, and table styles
- Create and save custom templates for reuse
- Use Flash Fill to detect patterns and transform data automatically
- Apply Quick Analysis tools for instant formatting, charts, and calculations
- Add, manage, and reply to comments in workbooks
- Share workbooks, set permissions, track changes, and collaborate in real-time

08 Excel Certification Readiness

- Import and organize data from multiple sources into a structured workbook
- Create and use named ranges to improve formula readability and maintenance
- Build complex formulas combining lookup, logical, and calculation functions
- Apply data validation and conditional formatting for data quality and visual analysis
- Create and analyze data using PivotTables with slicers and filters
- Design professional charts that effectively visualize data insights
- Configure professional print layouts with headers, footers, and page settings
- Protect worksheets and workbooks while maintaining usability
- Apply professional formatting and design principles consistently throughout workbooks
- Complete integrated multi-step projects that solve real business problems

GoSkills

Introduction to Sales

Intro to Sales: 07 Solidify the Relationship

- Understand Re-Cap
- Understand Move Forward
- Understand Satisfy Emotional and Logical Reasons to Buy

Intro to Sales: 01 Be an Expert

- Understand Be an Expert in Your Industry
- Understand Be an Expert in Your Product or Service
- Understand C.C.D. ☐ Clear and Concise Description

Intro to Sales: 02 Master Your Psychology

- Understand Master Your Belief in Your Company
- Understand Master Your Belief in Yourself

- Understand Master Your Attitude
- Understand Master Your Beliefs, Attitude and Emotions - Mind Reset
- Understand Master Your Beliefs, Attitude and Emotions - Mind Hack
- Understand Master Your Beliefs, Attitude and Emotions - Mind Cleanse

Intro to Sales: 03 Get Connected

- Create an Ideal Client List
- Research Your Ideal Client
- Reach Out

Intro to Sales: 04 Get Personal

- Understand The Captain
- Understand The Inspiration
- Understand The Status Quo
- Understand The Analyst

Intro to Sales: 05 The Horatio Effect

- Understand Expansive Questions
- Understand Narrow Questions
- Understand In Their Own Words
- Understand Hurts So Good

Intro to Sales: 06 The Presentation

- Understand The Introduction
- Understand Address Your Prospect's Needs
- Understand Features and Benefits

Intro to Sales: 08 The Follow Up

- Understand Phone Call Follow Up
- Understand Phone Call Follow Up 2 - Customer Care Call
- Understand Email Follow Up
- Understand Email Follow Up 2 ☐ Customer Care Email
- Understand Mail Follow Up

Intro to Sales: 09 Final Exam

- Completion

Project Management Basics

Project Management Basics: 01 Context

- Understand the phases of a project lifecycle and know how to approach a predictive project versus an adaptive project

Project Management Basics: 02 Planning

- Understand what is normally shown in a project budget
- Understand the difference between positive and negative risk
- Understand when and how to use a Gantt chart on a project

Project Management Basics: 03 Execution

- Understand the stages of a team building lifecycle
- Use a project dashboard to communicate project status with both management and your project team
- Understand how to gain stakeholder acceptance during project closeout

Project Management Basics: 04 Final Test

- Completion

Public Speaking

Public Speaking: 01 Creating Your Presentation

- Write a speech using relevant examples to illustrate your points

Public Speaking: 02 PowerPoint Presentations

- Deliver a successful presentation for work, school or personal interest

Public Speaking: 03 Public Speaking Mechanics

- Overcome my nerves and get my message across clearly
- Positively interact with my audience
- Manage a disruptive audience member

Public Speaking: 04 How To Tell Stories

- Deliver a speech that commands my audience's attention

Public Speaking: 05 Conclusion

- Continuously improve my public speaking skills

Public Speaking: 06 Final Exam

- Completion

Team Leadership

Team Leadership: 02 Team Processes

- Identify the roles and responsibilities of team members.
- Plan team building and oversee team goal setting.
- Track performance, accountability and time management.

Team Leadership: 01 Business Teams

- Distinguish between business groups and teams.

Team Leadership: 03 Team Communication

- Supervise team meetings, negotiations and decision making.

Team Leadership: 04 Decision Making and Conflict Resolution

- Apply problem solving techniques to resolve team conflicts.

Team Leadership: 05 Team Dysfunctions

- Apply problem solving techniques to resolve team dysfunction.

Team Leadership: 06 Final Exam

- Completion

Open Textbooks

An Introduction to Business Statistics for Analytics (1st Edition)

IBSA: 02 Measures of Variance

- Calculate the range by first calculating the maximum and minimum value in a data set.
- Calculate and understand the sample and population standard deviations.
- Calculate and understand the sample and population variances.
- Calculate and understand the coefficient of variation.

IBSA: 04 Probability Rules

- Calculate and understand the counting rules (multiplication, combinations, and permutations).
- Understand the "AND", "OR" and "Given" probability rules
- Apply the probability rules to a real world problem

- Construct and understand contingency tables.
- Use contingency tables to calculate probabilities.
- Understand what it means for events to be mutually exclusive or independent.
- Calculate and understand expected values.

IBSA: 06 Poisson Distributions

- Understand what it means for events to follow a Poisson distribution and calculate the probability of x events occurring per time period using the Poisson Probability Mass Function.
- Understand and calculate lambda (λ) for different length time periods.
- Calculate the probability of at least, at most or more than a certain number of events, x
- Calculate the mean and standard deviation of Poisson distributions.

IBSA: 01 Measures of Central Location

- Understand and calculate means (averages) both by hand and in Excel.
- Understand and calculate medians both by hand and in Excel.
- Understand the difference between a regular and weighted mean. Learn how to calculate a weighted mean and calculate for a missing weight or data value.

IBSA: 03 Frequency Distributions and Visualizing Data

- Construct and understand frequency distributions
- Construct and understand cumulative frequency distributions
- Calculate and understand percentiles, quartiles and five number summaries
- Create and interpret Histograms, Boxplots and Ogives
- Understand and recognize skewness or symmetric shapes in data sets.

IBSA: 05 Binomial Distributions

- Understand what it means for an experiment to be a Binomial experiment and calculate the probability of x successes occurring using the Binomial probability mass function formula.
- Understand and use Excel's BINOM.DIST() function.
- Calculate the probability of at most x number of successes.
- Calculate the probability of more than x number of successes.
- Calculate the probability of at least x successes or, $P(X \geq x)$.
- Calculate the mean and standard deviation of binomial distributions.

IBSA: 07 Continuous Uniform Distributions

- Calculate the probabilities above or below x -values.
- Calculate the probability of x being at least, more than, at most or less than a value.
- Calculate the missing x when given a probability in continuous uniform problems.

IBSA: 08 Exponential Distributions

- Understand the shape, statistical properties and probability formulas for exponential distributions.
- Use the Exponential Distribution formulas to calculate probabilities of times between events.
- Use Excel's EXPON.DIST() function to calculate probabilities of times between events.

IBSA: 09 Normal Distributions

- Understand the shape, statistical properties and formulas for Normal Distributions.
- Use the Empirical Rule and Excel's NORM.DIST() function to calculate probabilities.
- Use Excel's NORM.INV() to calculate x -values related to given areas.
- Apply NORM.DIST and NORM.INV to solve an industry quality control problem.

IBSA: 10 Sampling

- Understand: What is a random sample, Three rules for sampling, Random vs Pseudo random samples, Simple Random Sampling in Excel, Stratified Sampling in Excel
- Understand: Why it matters to differentiate between samples and populations, Some population and sample parameters of interest, When sampling should be used, The difference between a sample and a census, How to measure population characteristics using sampling
- Learn about the benefits and drawbacks of two methods of estimating population parameters: Point estimates, Interval estimates
- Learn about: The Central Limit Theorem, Sampling Distributions
- Calculate the typical metrics for sampling distribution problems.

IBSA: 11 Confidence Intervals

- Understand: What a confidence interval can mean, The different types of confident intervals we can build up, Revisit the differences between sample statistics and population parameters, Revisit the differences between point and interval estimates
- Examine the formulas to calculate: The lower and upper limits confidence interval limits, Margin of error, Required sample size, Examine when averages fail to forecast future data

- Look at an applied example where more than averages are needed to describe the data and speak of the flaw of averages concept.
- Do the following calculations to estimate the true mean when the population standard deviation (?) is unknown: Understand when z-scores and when t-scores are used, Understand the meaning of t-scores, Examine several Excel calls to calculate t-scores and the margin of error, Introduce the confidence intervals formula
- Do the following calculations to estimate the true mean when the population standard deviation (?) is unknown: Review an applied example where confidence intervals are well suited, Compare to the previous example where confidence intervals were not well suited, Calculate the lower and upper limits of the confidence interval, Calculate the required sample size given a required maximum margin of error
- Understand the concept of estimating population proportions and understand how these differ from population means.
- Examine applications of estimating true population proportions.
- Construct confidence intervals to estimate true population proportions as well as determine required sample sizes to reduce the margin of error below a certain limit.

IBSA: 12 One Variable Hypothesis Testing

- Understand hypothesis testing
- Explain what Type I and Type II Errors are
- Understand six steps for hypothesis testing on either means or proportions.
- Outline the different formulae required for left, right or two-tailed tests.
- Perform left, right and two-tailed hypothesis tests for means from one sample.
- Perform left, right and two-tailed hypothesis tests for proportions from one sample.

IBSA: 13 Hypothesis Testing for Two Population Proportions

- Understand the steps to test for differences in population proportions.
- Outline the different formulae required for left, right or two-tailed tests.
- Perform left, right and two-tailed hypothesis tests for differences in proportions.

IBSA: 14 Hypothesis Tests to Compare Two Population Means

- Set up a Matched-Pair t-Test
- Use Excel's Data Analysis Toolpak to calculate values in the test
- Draw conclusions based off of your test results
- Determine which test to use (Pooled or Unpooled) Variance t-Test
- Use Excel's Data Analysis Toolpak to calculate values in the test

- Draw conclusions based off of the test results

IBSA: 15 Chi-Squared Test of Independence

- Define the steps and formula required to perform a Chi-Squared Test for Independence
- Solve a Chi-Squared Test for Independence problem both with manual and Excel calculations.

IBSA: 16 Analysis of Variance (ANOVA)

- Understand how to perform an ANOVA test.

Building Relationships With Business Communication

BRBC01: Developing Business Relationships

- Select appropriate message channels and formats.
- Determine message purpose and objectives.
- Identify personal and social factors affecting communication.
- Explain the benefits of effective workplace communication.
- Outline ethical responsibilities in business communication.

BRBC02: Essential Tools of Business Communication

- Identify and apply Aristotle's rhetorical elements of logos, ethos, and pathos,
- Develop skills in rhetorical listening,
- Identify and apply techniques of visual rhetoric,
- Apply the cognate strategies in oral and written communication,
- Identify reliable sources, and use fact-checking strategies on online sources.

BRBC03: Presentations

- Manage speech anxiety effectively.
- Choose the right delivery method for specific purposes.
- Establish audience connections through storytelling.
- Deliver appropriate Land Acknowledgements.
- Select suitable organizational patterns for presentations.

BRBC04: Communicating in Writing

- Identify the qualities of good business writing,
- Distinguish between formal and informal writing styles,
- Create routine and informational email messages,
- Format memos and letters appropriately, and

- Organize and format a formal recommendation report.

BRBC05: APA Style Referencing

- Explain why using citations is important
- Create and format reference list citations in APA Style
- Identify two ways to insert a citation
- Create and format in-text citations in APA Style

Business Law I

Business Law I: Chapter 01 Introduction to Law and Legal Systems

- Distinguish different philosophies of law/schools of legal thought and explain their relevance.
- Describe the purpose of a functioning legal system.
- Identify the sources of law and which laws have priority over other laws.
- Explain the basic differences between the U.S. legal system and other legal systems.

Business Law I: Chapter 02 Courts and the Legal Process

- Describe the two different court systems in the United States, and explain why some cases can be filed in either court system.
- Explain the importance of subject matter jurisdiction and personal jurisdiction and know the difference between the two.
- Describe the various stages of a civil action: from pleadings, to discovery, to trial, and to appeals.

Business Law I: Chapter 03 Alternative Dispute Resolution

- Describe the process of negotiation as it is commonly employed in business.
- Discuss the process of mediation as an alternative dispute resolution (ADR) strategy.
- Discuss the option of arbitration as an alternative dispute resolution (ADR) strategy.
- Describe the benefits and drawbacks of ADR as compared to litigation.

Business Law I: Chapter 04 Introduction to Tort Law

- Explain the purpose of tort law.
- Identify the three classifications of torts.
- Discuss various types of intentional torts.
- Explain negligence and defenses to claims of negligence.
- Describe strict liability torts and the reasons for them in the U.S. legal system.

Business Law I: Chapter 05 Introduction to Contract Law

- Explain the sources of contract law.
- Discuss a basic taxonomy for classifying contracts.
- Describe the key terms that are used to identify types of contracts.

Business Law I: Chapter 06 The Agreement

- Explain the three requirements of a valid offer.
- Describe the mirror image rule of acceptance.
- Identify the situations under which an offer may be revoked.

Business Law I: Chapter 07 Consideration

- Define consideration.
- Describe the requirements of consideration.
- Explain why some attempts to contract lack consideration.
- Identify exceptions to the requirement of consideration.

Business Law I: Chapter 08 Capacity

- Explain the element of contractual capacity.
- Identify when a contract is voidable or void due to lack of capacity.
- Apply the sword and shield doctrine.

Business Law I: Chapter 09 Legality

- Identify the types of contracts that are illegal.
- Explain the various types of bargains made illegal by statute.
- Explain the various types of bargains made illegal by public policy.
- Describe courts deal with disputes concerning illegal contracts.
- Analyze whether the element of Legality is present in an attempt to contract.

Business Law I: Chapter 10 Real Assent

- Explain the difference between undue influence and duress.
- Explain the difference between the different types of misrepresentation
- Explain the different between mutual and unilateral mistakes

Business Law I: Chapter 11 Form and Meaning

- Identify the types of contracts that must be evidenced by some writing under the Statute of Frauds.
- Explain the exceptions to the requirements of the various Statutes of Frauds.

- Describe the various ways to satisfy the requirements when a contract must be written.
- Analyze how a contract should be interpreted if its meaning is disputed.
- Apply the parol evidence rule to fully integrated contracts.

Business Law I: Chapter 12 Third-Party Rights

- Explain how an assignment of contract rights is made and how it operates.
- Explain how a delegation of duties is made and how it operates.
- Compare and contrast Intended and Incidental Third-Party Beneficiary Agreements.
- Analyze the rights and remedies available to third parties in contracts.

Business Law I: Chapter 13 Performance and Discharge

- Explain when performance, partial performance or no performance may discharge contractual obligations.
- Compare and contrast complete performance, substantial performance, satisfactory performance and material breach.
- Describe the various ways the parties to a contract may agree to terminate mutual obligations under the contract.
- Identify when performance of the contract becomes variously impossible, very difficult, or useless, and that these circumstances may give rise to discharge.

Business Law I: Chapter 14 Remedies

- Explain the reason for contract remedies and how courts decide which remedies are appropriate.
- Describe the interests that are protected by contract remedies.
- Calculate and apply the types of legal remedies.
- Apply the types of equitable remedies.
- Discuss the limitations on contract remedies.

Business Mathematics

BM00: Introduction

- Completion

BM01: Business Applications of Basic Mathematics

- Understand the concept of ratios and their relevance in business, including how to calculate and interpret them
- Explore proportions and their application in various business scenarios, learning how to set up and solve proportion problems

- Grasp the concept of rates with more than two quantities and how to use them in practical business contexts, such as calculating unit prices

BM02: Functions and Applications

- Define functions and their significance in business applications, including recognizing linear functions and understanding their properties
- Explore cost functions and their role in cost analysis for businesses, learning how to set up and work with cost equations
- Master solving systems of equations and their application in solving real-world business problems, such as finding the intersection point of supply and demand curves

BM03: Simple Interest

- Comprehend the concept of simple interest and its calculation, including understanding the relationship between principal, rate, and time
- Explore the time value of money and its implications for business decisions, including calculating future values and present values
- Understand the concept of equations of value and how they can be used in solving practical business problems related to loans and investments

BM04: Compound Interest

- Gain insight into compound interest, including nominal and periodic rates, and understand how it differs from simple interest
- Master the compound interest formula and its application in calculating the future value of investments or loans
- Explore advanced concepts related to compound interest, including handling multiple cash flows and understanding equivalent and effective rates

BM05: Annuities

- Understand the concept of annuities, including how they apply to savings accounts, loans, and other financial instruments
- Explore different types of annuities, such as deferred annuities and perpetuities, and their use in various financial scenarios
- Grasp the principles of mortgages, including the 32% rule and bi-weekly payments, and learn how to make informed decisions regarding lump sum payments and refinancing

BM06: Investment Decisions

- Evaluate business plans and investment opportunities, considering factors like rate of return and net present value to make informed investment decisions
- Master the use of financial tools like the BAII Plus calculator to analyze cash flows and calculate internal rates of return and payback periods
- Understand how different lifetimes and cost comparisons impact investment decisions, enabling you to assess the financial feasibility of various projects

BM07: Extra Problems

- Completion

BM08: Appendices

- Completion

Fundamentals of Business, 4th edition

Fundamentals of Business: Chapter 01 Teamwork in Business

- Define a team and describe its key characteristics.
- Explain why organizations use teams and describe different types of teams.
- Explain why teams may be effective or ineffective.
- Identify factors that contribute to team cohesiveness.
- Understand the importance of learning to participate in team-based activities.
- Identify the skills needed by team members and the roles that members of a team might play.
- Learn how to survive team projects in college (and actually enjoy yourself).
- Explain the skills and behaviors that foster effective team leadership.

Fundamentals of Business: Chapter 02 The Foundations of Business

- Describe the concept of stakeholders and identify the stakeholder groups relevant to an organization.
- Discuss and be able to apply the PESTEL macro-business-environment model to an industry or emerging technology.
- Explain other key terms related to this chapter including entrepreneur, profit, and revenue.

Fundamentals of Business: Chapter 03 Economics and Business

- Describe the foundational philosophies of capitalism and socialism.
- Discuss private property rights and why they are key to economic development.

- Discuss the concept of gross domestic product (GDP).
- Explain the difference between fiscal and monetary policy.
- Discuss the concept of the unemployment rate measurement.
- Discuss the concepts of inflation and deflation.
- Explain other key terms related to this chapter including supply, demand, equilibrium price, monopoly, recession, and depression.

Fundamentals of Business: Chapter 04 Ethics and Social Responsibility

- Define business ethics and explain what it means to act ethically in business.
- Explain why we study business ethics.
- Identify ethical issues that you might face in business, such as insider trading, conflicts of interest, and bribery, and explain rationalizations for unethical behavior.
- Identify steps you can take to maintain your honesty and integrity in a business environment.
- Define corporate social responsibility and explain how organizations are responsible to their stakeholders, including owners, employees, customers, and the community.
- Discuss how you can identify an ethical organization, and how organizations can prevent behavior like sexual harassment.
- Learn how to avoid an ethical lapse, and why you should not rationalize when making decisions.

Fundamentals of Business: Chapter 05 Business in a Global Environment

- Explain why nations and companies participate in international trade.
- Describe the concepts of absolute and comparative advantage.
- Explain how trade between nations is measured.
- Define importing and exporting.
- Explain how companies enter the international market through licensing agreements or franchises.
- Describe how companies reduce costs through contract manufacturing and outsourcing.
- Explain the purpose of international strategic alliances and joint ventures.
- Understand how US companies expand their businesses through foreign direct investments and international subsidiaries.
- Appreciate how cultural, economic, legal, and political differences between countries create challenges to successful business dealings.

- Describe the ways in which governments and international bodies promote and regulate global trade.
- Discuss the various initiatives designed to reduce international trade barriers and promote free trade.

Fundamentals of Business: Chapter 06 Forms of Business Ownership

- Identify the questions to ask in choosing the appropriate form of ownership for a business.
- Describe the sole proprietorship and partnership forms of organization, and specify the advantages and disadvantages.
- Identify the different types of partnerships, and explain the importance of a partnership agreement.
- Explain how corporations are formed and how they operate.
- Discuss the advantages and disadvantages of the corporate form of ownership.
- Define mergers and acquisitions, and explain why companies are motivated to merge or acquire other companies.
- Examine special types of business ownership, including limited-liability companies and not-for-profit corporations.

Fundamentals of Business: Chapter 07 Entrepreneurship and Small Business Development

- Define entrepreneur and describe what it means to be entrepreneurial.
- Identify common roles or activities needed to start your own business.
- Explain the conditions of when entrepreneurship takes place.
- Describe the different kinds of funding approaches to starting a company.
- Identify different parts of an entrepreneurial ecosystem that entrepreneurs can leverage when starting up.
- Explain the assumptions that can cause some startups to fail.

Fundamentals of Business: Chapter 08 Management and Leadership

- Identify the four interrelated functions of management: planning, organizing, leading, and controlling.
- Understand the process by which a company develops and implements a strategic plan.
- Explain how managers direct others and motivate them to achieve company goals.

- Describe the process by which a manager monitors operations and assesses performance.
- Explain what benchmarking is and its importance for managing organizations.
- Describe the skills needed to be a successful manager.

Fundamentals of Business: Chapter 09 Structuring Organizations

- Identify the three levels of management and the responsibilities at each level.
- Discuss various options for organizing a business, and create an organization chart.
- Understand how specialization helps make organizations more efficient.
- Discuss the different ways that an organization can departmentalize.
- Explain other key terms related to this chapter such as chain of command, delegation of authority, and span of control.

Fundamentals of Business: Chapter 10 Operations Management

- Define operations management and discuss the role of the operations manager in a manufacturing company.
- Describe the decisions and activities of the operations manager in overseeing the production process in a manufacturing company.
- Explain how to create and use both PERT and Gantt charts.
- Explain how manufacturing companies use technology to produce and deliver goods in an efficient, cost-effective manner.
- Describe the decisions made in planning the product delivery process in a service company.
- List the characteristics that distinguish service operations from manufacturing operations and identify the activities undertaken to manage operations in a service organization.
- Explain how manufacturing and service companies alike use total quality management and outsourcing to provide value to customers.

Fundamentals of Business: Chapter 11 Motivating Employees

- Define motivation, and understand why it is important in the workplace.
- Understand the difference between intrinsic and extrinsic motivation.
- Explain the major theories of motivation: Hierarchy-of-Needs theory, Two-Factor theory, Expectancy theory, Equity theory

Fundamentals of Business: Chapter 12 Managing Human Resources

- Define human resource management and explain how managers develop and implement a human resource plan.
- Explain how companies train and develop employees, and discuss the importance of a diverse workforce.
- Identify factors that make an organization a good place to work, including competitive compensation and benefits packages.
- Explain how managers evaluate employee performance and retain qualified employees.

Fundamentals of Business: Chapter 13 Union/Management Issues

- Explain why workers unionize and how unions are structured, and describe the collective-bargaining process.
- Discuss key terms associated with union and management issues, such as mediation and arbitration.
- Identify the tactics used by each side to support their negotiating positions: strikes, picketing, boycotting, and lockouts.

Fundamentals of Business: Chapter 14 Marketing: Providing Value to Customers

- Define the terms marketing, marketing concept, and marketing strategy.
- Outline the tasks involved in selecting a target market.
- Identify the four Ps of the marketing mix.
- Explain how to conduct marketing research.
- Discuss various branding strategies and explain the benefits of packaging and labeling.
- Describe the elements of the promotion mix.
- Explain how companies manage customer relationships.
- Identify the advantages and disadvantages of social media marketing.

Fundamentals of Business: Chapter 15 Pricing Strategy

- Identify pricing strategies that are appropriate for new and existing products.
- Understand the stages of the product life cycle.

Fundamentals of Business: Chapter 16 Hospitality and Tourism

- Define hospitality and the pineapple tradition.
- Understand the different types of events, meetings, and conventions.
- Examine the different categories of food service operations.
- Identify the types of hotel categories and how they are determined.
- Understand what tourism is: definition, components, and importance.

- Understand the economic, social, and environmental benefits and costs of tourism.

Fundamentals of Business: Chapter 17 Accounting and Financial Information

- Define finance and how the role of the financial manager impacts a firm's overall strategy.
- Explain the key differences between debt and equity, and understand the major types and features of long-term debt.
- Evaluate a company's performance using financial statements and ratio analysis.
- Define accounting and explain the differences between managerial accounting and financial accounting.
- Identify some of the users of accounting information and explain how they use it.
- Explain the function of the income statement.
- Explain the function of the balance sheet.
- Calculate a break-even point given the necessary information.

Fundamentals of Business: Chapter 18 Personal Finances

- Explain the financial planning life cycle.
- Discuss the advantages of a college education in meeting short- and long-term financial goals.
- Develop strategies to avoid being burdened with debt.
- Explain how to manage monthly income and expenses.
- Define personal finances and financial planning.
- Explain compound interest and the time value of money.
- Discuss the value of getting an early start on your plans for saving.

Fundamentals of Business: Chapter 19 Technology in Business

- Explain why computer networks are an important part of today's information technology systems.
- Describe the types of systems that make up a typical company's management information system.
- Understand the importance and role of cyber security and the impact on companies and personal information if not practiced.
- Explore and understand the leading trends in information technology.
- Describe the best ways to protect computers and the information they contain.
- Explain how technology management and planning help companies optimize their information technology systems.

- Discuss how information technology has transformed business and managerial decision-making.

Introduction to Entrepreneurship

Intro to Entrepreneurship: 02 Entrepreneurial Characteristics

- Debate the role of creativity and innovation in entrepreneurship
- Analyze what leads to entrepreneurial success
- Reflect on entrepreneurial skills and abilities

Intro to Entrepreneurship: 04 Your Entrepreneurial Potential

- Create an entrepreneurial plan

Intro to Entrepreneurship: 01 What is Entrepreneurship?

- Reflect on the role entrepreneurs have in today's society
- Identify the different types of entrepreneurship
- Evaluate the relevance of different types of entrepreneurship
- Define entrepreneurship

Intro to Entrepreneurship: 03 The Entrepreneurial Process

- Identify exciting entrepreneurial opportunities
- Evaluate exciting entrepreneurial opportunities
- Model the entrepreneurial process for the exciting entrepreneurial opportunities
- Create entrepreneurial planning documents

Principles of Managerial Accounting

Principles of Managerial Accounting: 01 Managerial Accounting and Cost Concepts

- Distinguish the different purposes of financial accounting and managerial accounting
- Distinguish between product and period costs and classify product costs as direct material, direct labor, or manufacturing overhead
- Distinguish between fixed, mixed, and variable costs, and relate them to cost drivers
- Define the relevant range of production
- Use the high-low method to predict future costs
- Contrast the contribution margin income statement and the traditional income statement
- Construct a traditional income statement

- Construct a contribution margin income statement and calculate the contribution margin amount and ratio

Principles of Managerial Accounting: 02 Job-order Costing

- Calculate the organization-wide predetermined manufacturing overhead rate
- Describe a job-order costing system
- Describe the flow of inventory costs in a job-order costing system
- Apply manufacturing overhead to jobs using an organization-wide predetermined manufacturing overhead rate
- Complete a job-cost sheet and compute the total cost of a job, cost per unit, and selling price
- Calculate multiple predetermined manufacturing overhead rates

Principles of Managerial Accounting: 04 Cost Volume Profit (CVP) Analysis

- Identify the purposes of cost volume profit analysis
- Explain how the contribution margin income statement is used for cost volume profit analysis
- Apply cost volume profit analysis to show the effects on net operating income from changes in variable costs, fixed costs, selling price, and sales volume
- Calculate the breakeven point in sales dollars and units sold
- Calculate target profit in sales dollars and units sold

Principles of Managerial Accounting: 05 Segmented Income Reporting

- Explain the purposes and advantages of segmented income reporting
- Prepare a segmented income statement
- Compute contribution margin and segment margin
- Identify and account for segment traceable fixed costs and common fixed costs
- Segments within segments
- Segment cost volume profit analysis
- Compute breakeven for the whole organization as well as individual segments within the organization

Principles of Managerial Accounting: 06 Budgeting

- Describe the purposes of organizational budgeting
- Describe the budgeting process using a master budget
- Prepare a manufacturing overhead budget
- Prepare a sales budget

- Prepare a cost of goods sold budget
- Prepare a selling and administrative budget
- Prepare a production budget
- Prepare a direct materials purchases budget
- Prepare a direct labor budget
- Prepare a budgeted income statement

Principles of Managerial Accounting: 07 Flexible Budgeting and Performance Evaluation

- Describe planning budgets
- Prepare a planning budget
- Describe the limitations of planning budgets
- Prepare a flexible budget
- Prepare a flexible budget performance evaluation report
- Calculate and analyze activity variances
- Calculate and analyze revenue and spending variances

Principles of Managerial Accounting: 08 Standard Costs and Variance Analysis

- Describe the purpose of standard costs used for manufacturing costs
- Compute the direct materials price and quantity variances and explain their significance
- Compute the direct labor rate and efficiency variances and explain their significance
- Compute the variable manufacturing overhead rate and efficiency variances and explain their significance

Principles of Managerial Accounting: 09 Decentralized Performance Evaluation

- Describe the advantages and disadvantages of a decentralized organizational structure
- Describe responsibility centers and their performance evaluation
- Evaluate the performance of investment centers using profit margin ratio, asset turnover ratio, and return on investment ratio
- Describe the advantages and disadvantages of return on investment (ROI)
- Describe social return on investment (SROI)
- Compute residual income and identify its strengths and weaknesses

Principles of Managerial Accounting: 10 Differential Decision Making

- Define differential decision making
- Identify relevant and irrelevant costs of differential decision making

- Prepare the analysis for an add or drop a segment decision
- Prepare the analysis for a make or buy decision
- Prepare the analysis for a special order decision
- Prepare the analysis for a sell or process further decision

Principles of Managerial Accounting: 11 Capital Budgeting Decision Making

- Determine the payback period for an investment
- Compute the simple rate of return for an investment
- Apply the time value of money concept by computing the present value of a sum of money
- Compute the internal rate of return for an investment
- Evaluate the acceptability of an investment project using the net present value method
- Analyze capital budgeting decision making methods

The Math of Money

TMM01: The Math of Money

- Acquire essential financial terminology and concepts necessary for discussing and analyzing financial matters
- Master the fundamentals of balance sheets and their significance in evaluating financial health and making financial decisions
- Understand the fundamentals of the macroeconomy, including its components and how they impact financial decisions

TMM02: Debt

- Explore the world of credit cards and understand their mechanics, benefits, and potential pitfalls
- Examine different aspects of automobile financing and grasp the key factors to consider when financing a car
- Dive into the complexities of mortgages, including terminology and calculations involved in mortgage loans

TMM03: Investing and Retirement

- Gain insights into the basics of investment, including various investment vehicles and their risk-return profiles
- Explore the world of stocks, bonds, and mutual funds, understanding how they function and their roles in investment portfolios

- Develop a comprehensive understanding of retirement planning, including the importance of saving, investment strategies, and types of retirement accounts

TMM04: Taxes

- Examine non-income taxes, such as property taxes and sales taxes, and understand their impact on personal finances
- Delve into income tax terminology and forms, learning to navigate the complexities of income tax regulations
- Solve income tax problems, applying tax rules to real-life scenarios and understanding the implications of various tax strategies

TMM05: Insurance

- Explore different types of insurance, including health insurance, property insurances, and income insurances, and their roles in managing financial risks
- Master the concepts and terminologies related to insurance policies and coverage, enabling effective decision-making in insurance matters

Pointful Education

Communication Skills for Business

Communication Skills for Business 00

- Completion

Communication Skills for Business 01: Basic Communication Principles

- Identify basic delivery standards (including facing the audience or speaker, making eye contact, and communicating messages or feedback through nonverbal methods)
- Moderate intonation, rate tone, volume, enunciation; keeping attention on the message and deferring judgment
- Differentiate between professional and unprofessional communication and behaviors (including recognizing professional email addresses)
- Cultivate an appropriate social media presence (including profile information, posts, photos, and videos)
- Describe professional time management skills (including punctuality, attendance, and notification)

Communication Skills for Business 02: Effective Communication Strategies Part I

- Analyze the effect of the audience on how messaging is delivered (including identifying audience data required to craft an effective message, analyzing audience demographics like age, education, gender, marital status, race, religion, and other statistical population factors)
- Analyze the effect of the environment on a message (including in-person vs remote, audience size, room size, and available equipment)
- Identify the purpose of a communication scenario (including primary message to be delivered)
- Differentiate between informative, persuasive, and motivational messages
- Distinguish between ethical, emotional, and logical persuasion

Communication Skills for Business 03: Effective Communication Strategies Part II

- Address legal and ethical issues in a communication scenario, including: Defining and analyzing accessibility issues (including ensuring that presentations and documents comply with accessibility standards), Attribution, Bias-free communication (and identifying biased communication terminology), Confidentiality (including removing personal data from presentations and documents), Copyright, trademarks, and plagiarism, Responding to requests for data
- Select the most appropriate medium for the communication to be given
- Define and differentiate between face-to-face discussions, phone calls, voice messages, and written messages (including emails, text messages, business letters, job applications, resumes, and meeting agendas/meeting minutes)
- Identify various visual messaging methods such as PowerPoint presentations, videos, and business-related social media messages using platforms like Instagram, Facebook, LinkedIn, and X (formerly Twitter)
- Outline and summarize your message effectively (including creating and completing a concise outline, outlining messages, and summarizing the planned messages)

Communication Skills for Business 04: Best Practices for Creating Business Deliverables Part I

- Assemble accurate business communication deliverables
- Create business communications such as business letters, meeting agendas, meeting minutes, and resumes from components
- Analyze the effectiveness of different forms of business communications using spelling and grammar tools

- Apply visual design standards to business communications

Communication Skills for Business 05: Best Practices for Creating Business Deliverables Part II

- Identify design principles of business communications, including: Balance, Proximity, Alignment, Repetition, Contrast, Space, Rule of thirds, Color choice and white space.
- Distinguish between effective and ineffective visual design for business communications (including presentation slides, emails, and documents)
- Identify effective uses of data visualization to present complex information
- Distinguish and determine the appropriateness of using elements like graphs, charts, plots, and infographics
- Determine the best way to interpret the message of a data visualization graphic

Communication Skills for Business 06: Delivering the Message

- Describe the variables involved in delivering an effective message
- Identify methods of adapting messages based on audience feedback (including direct feedback and indirect feedback like body language)
- Identify personal presentation elements like attire and hygiene
- Understand how environmental variables like location, physical space, technology, and formality can affect the message delivery
- Evaluate issues like regional language variations, imprecise language, jargon, context, and perceptions when delivering the message

Communication Skills for Business 07: Receiving Communications

- Restate the key points of a given message in business communication
- Identify the primary goal of verbal communication and summarize it
- Identify the primary goal of written communication and summarize it
- Identify appropriate responses and clarifying questions for a business message

Communication Skills for Business 08: Analyzing Communication Scenarios

- Analyze the important factors of obtaining employment (including identifying common mistakes made by interviewers and applicants, and distinguishing between appropriate and inappropriate job application documents)
- Analyze expressions of and responses to feedback (including giving constructive criticism, receiving constructive criticism, seeking feedback, setting and clarifying expectations, and modeling correct behavior as a feedback mechanism)

- Analyze communication etiquette within a business hierarchy, which can include communicating with supervisors, peers, subordinates, and group collaboration
- Identify the problem, solution, and appropriate action(s) of a customer service request
- Define and restate the customer problem, identify the solution the customer desires and available solutions, and interface with team members and customers

Communication Skills for Business 09: Course Wrap-up/Final Exam

- Completion

Entrepreneurship and Small Business Certification

ESB 00: Module 0 - Start Here

- Completion

ESB 01: The Entrepreneur

- Identify the characteristics of entrepreneurs
- Describe a self-assessment outcome and identify the strengths, weaknesses, and risk tolerance identified in a self-assessment
- Describe how to compensate weaknesses of a self-assessment with services and other resources
- Recognize a business opportunity
- Identify the risks, benefits, opportunities, and drawbacks of being an entrepreneur

ESB 02: Opportunity Recognition

- Identify the benefits and drawbacks of different types of opportunities (e.g., start a new business, buy an existing business, and buy a franchise)
- Analyze the demand for the goods or service
- Analyze opportunities in an environment and market
- Identify the customers or potential customers for a business
- Recognize a value proposition

ESB 03: Starting a Business Part I

- Identify the purposes and value of a business plan
- Identify the appropriate legal structure, benefits, and drawbacks for different legal structures for a business
- Given a scenario, identify different types of licenses and regulations that are required

- Identify the benefits and drawbacks of various sources of startup funding: Equity (friends/family, angels, venture), Debt (bank, credit cards, personal loans), and Grants (government, foundation, corporate)

ESB 04: Starting a Business Part II

- Given a scenario, identify support that is available for the business on a local, state, and federal level
- Identify the ethical practices of a business
- Identify the social responsibilities of a business
- Identify potential exit strategies for a business

ESB 05: Business Operations Part I

- Given a scenario, identify support that is available for the business on a local, state, and federal level
- Determine whether work can be completed by the owner or whether employees or service providers are needed
- Identify the taxes that are required to be paid by a business
- Identify intellectual property issues of trademarks, copyrights, and patents

ESB 06: Business Operations Part II

- Identify standard operating procedures (e.g., setup, conduct, internal controls, separation of duties)
- Identify a supply chain (e.g., clear commitments, active communication, negotiated costs)
- Identify the factors that lead to sustainability
- Identify milestones as part of a growth strategy

ESB 07: Marketing and Sales

- Develop a sales strategy and identify the characteristics of a successful sale
- Identify and analyze the costs/benefits of finding customers
- Identify how to retain customers and develop a relationship with repeat customers
- Determine value and methods of communication through traditional media, including brochures and advertising
- Determine value and methods of communication through digital media, including websites and social media

ESB 08: Financial Management Part I

- Interpret basic financial statements such as income statements and balance sheets
- Identify the factors that influence credit ratings and the importance of a positive credit rating
- Given a list of expenses, identify which are fixed versus variable
- Identify the factors that impact the price to the customer

ESB 09: Financial Management Part II

- Identify and analyze cash flow including accounts receivable and inventory
- Identify the breakeven point for the business
- Identify and analyze cash flow including accounts payable and debt
- Create a cash flow budget

ESB 10: Course Wrap-up/Final Exam

- Completion

Project Management

ProjMgmt 00: Start Here

- Completion

ProjMgmt 01: Introduction to Project Management

- List components of a project and a business case.
- Define a project, product, program, and portfolio.
- Define project management, a business case, project scope, and deliverables.
- Define a milestone and task
- Define issues, risks, assumptions, and constraints.

ProjMgmt 02: Project Management Planning Part I

- Define the different types of resources (e.g., human and material).
- Identify features of traditional plan-based delivery and agile delivery.
- Identify project management ethics (refer to PMI code of ethics).
- Identify concepts of a project management plan (e.g., cost, quality, risk, schedule, etc.).
- Identify common terminology in business concepts related to project management (e.g., change management, culture, strategy, governance, trade-off, performance metrics, prioritization, categorization, work breakdown, reporting, conflict, accuracy vs. precision, leadership, and motivation, etc.).

ProjMgmt 03: Project Management Planning Part II

- Define the key stakeholder responsibilities such as project managers, sponsors, team leaders, team members, project clients, etc.
- Identify the features of different organizational environments (e.g., co-location and virtual teams, decentralized and centralized organization, and organizational structures [functional, matrix, projectized]).
- Identify leadership and management.
- Describe organizational structures (e.g., co-location and virtual teams, decentralized and centralized organization, and organizational structures [functional, matrix, projectized]).
- Identify benefits and concepts associated with risk register and the stakeholder register.
- Define the key stakeholder roles such as project managers, sponsors, team leaders, team members, project clients, etc.

ProjMgmt 04: Tools and Systems

- Identify the typical tools used for creating a project schedule.
- Define the characteristics and benefits of various project management tools.
- Define common information gathering tools or techniques.
- Describe the components of an effective meeting.

ProjMgmt 05: Traditional Plan-Based Methodologies and Scheduling

- Identify the primary rationale for traditional plan-based projects and the process groups and knowledge areas (e.g., cost, quality, risk, schedule, etc.).
- Identify project phases and the correct order of the phases.
- Define a typical project structure for a traditional plan-based approach.
- Identify the steps to create a schedule.
- Define a work breakdown structure.

ProjMgmt 06: Executing and Controlling Traditional Plan-Based Projects

- List the types of dependencies (e.g., sequence, start to start, finish to start, etc.).
- Define project management, a business case, project scope, and deliverables.
- Define a critical path.
- Describe the project controls in traditional plan-based projects (e.g., earned value, baselines, etc.).

ProjMgmt 07: Agile Projects Part I

- Identify the primary rationale for agile and traditional plan based projects.
- Identify the key tenants/principles of agile.
- Recognize hybridization.
- Define the use of transparency in Agile projects.
- Describe the principle of Servant Leadership.

ProjMgmt 08: Agile Projects Part II

- Identify common agile methodologies.
- State the components of agile sequencing.
- Identify the factors/inputs for determining the framework (e.g., time, scope, etc.).
- Identify agile project progress metrics.
- State the importance of agile project tracking.

ProjMgmt 09: Agile Projects Part III

- Define the role of the agile project member.
- Identify good team principles in agile project management.
- Identify examples of team collaboration in agile project management.
- Describe the project controls in agile projects.
- Define the role of the agile project lead.

ProjMgmt 10: Agile Projects Part IV

- Describe the task decomposition process in an agile project management
- Describe the task prioritization process in an agile project management
- Identify monitor and controlling techniques in agile projects
- Identify the components of a specific agile plan (e.g., Scrum, XP, Scaled Agile Framework, Kanban, etc.)

ProjMgmt 11: Business Analysis Roles and Responsibilities

- List critical/core stakeholder roles and responsibilities (e.g., business analysts, business sponsor, process owner, product manager, product owner, etc.).
- Define types of roles (internal vs external).
- List elements in a communication plan and identify communication channels/tools.
- List ways of gathering requirements and tools used for capturing requirements (e.g., use case, user stories, process diagrams, etc.).
- Define requirements traceability matrix/product backlog.

- List types of requirements (e.g., functional, nonfunctional, stakeholder, security, solution, business, migrating, market research, bench marking, etc.).

ProjMgmt 12: Product Roadmap

- Define what a product roadmap is
- List product roadmap components
- Define a release plan
- Identify components of product delivery
- Define components of project/product acceptance (e.g., requirements traceability matrix/product backlog, Transition Plan, etc.)

ProjMgmt 13: Course Wrap-up/Final Exam

- Completion

Startups and Innovation

Module 00: Startups and Innovations Course Intro

- Completion

Module 01: Introduction to Entrepreneurship and Startups

- Discuss the history of entrepreneurship and startups in the U.S.
- Define entrepreneurship and describe an entrepreneurial mindset
- Evaluate the benefits of entrepreneurship and startups as a career path, as well as common mistakes and misconceptions
- Examine employment opportunities in entrepreneurship to consider entrepreneurship as an option for career planning
- Outline the topics that will be covered throughout this course (startups, innovation, competition, team-building)

Module 02: MVP and Product Market Fit

- Employ entrepreneurial discovery strategies to generate feasible ideas for business ventures
- Describe what a minimum viable product (MVP) is and provide examples
- Evaluate the startup scooter company Lime and describe its product/market fit
- Define product/market fit and evaluate different ways for evaluating product/market fit of a business idea

Module 03: Business Models

- Differentiate between products, services, and platforms
- Define key business model terms such as B2B, B2C, and others
- Outline the various industries that exist in the U.S. and global economies
- Describe the opportunities for entrepreneurship in a given industry
- Compare service platforms that are common for startups (SaaS, IaaS, BaaS, PaaS, etc.)
- Evaluate the history of the startup Airbnb and describe how it created a new and unique platform

Module 04: Competition

- Define differentiation and discuss the importance of differentiating yourself as a startup
- Describe tools and methods used to analyze competitors and competing products/solutions
- Examine the advantages that startups have over larger competitors
- Conduct market research on a chosen industry
- Evaluate the history and competition between Facebook and MySpace

Module 05: Disruptive Innovation

- Describe innovation and provide examples of innovative ideas and products
- Examine why startups can be better at innovation than established companies
- Outline the theory of disruptive innovation
- Compare the tradeoff between quality and price in products
- Evaluate the history of the startup Netflix and how it evolved; describe how it exhibited disruptive innovation

Module 06: Building a Team

- Define what a co-founding team is and describe the typical roles and responsibilities of key founding members (CEO, CTO, Product, support, CFO, CMO, Sales, board/advisors)
- Describe ways of researching and networking to find and build a co-founding team
- Understand the methods that businesses use to recruit, train, and develop human resources
- Outline the components of a company's culture and describe ways as the founder to create and foster a startup's culture
- Evaluate the company Coinbase and describe its challenges in building a team to meet its growth

Module 07: Marketing a Startup

- Describe the strategies for marketing a startup on a limited budget
- Compare the challenges of marketing a startup versus marketing established products
- Describe social media and online marketing
- Acquire information to guide business decision-making
- Evaluate the startup company Spotify and describe how it used marketing strategies to grow its business

Module 08: Writing a Pitch Deck

- Describe the strategies for Describe the key components of a startup pitch deck (problem/solution, vision, timing)marketing a startup on a limited budget
- Describe the key components of a startup pitch deck (financials, total addressable market, competition, uses of funds)
- Identify and define the key numbers and terms that an investor will expect in a pitch deck
- Create a pitch deck of a fictional company
- Evaluate the pitch deck of the asteroid mining company Deep Space Industries

Module 09: Raising Capital

- Evaluate the pros and cons of traditional sources of funding for a startup, including self-funding, family/friends, loans, venture capital)
- Discuss relatively newer forms of raising capital, such as incubators, accelerators, and crowdfunding
- Define key terms related to raising capital for a startup (valuation, pre/post-money, series A, B, C, rounds)
- Describe the challenges and opportunities of working with a venture capital investor
- Evaluate the company VIPKid and its multiple rounds of fundraising

Module 10: Possibilities and Opportunities

- Describe social/impact/non-profit entrepreneurship and ventures
- Differentiate between the serial entrepreneur and the entrepreneur focused on building a lifetime company
- Select a harvesting strategy that matches the entrepreneur's desired goals regarding the business venture
- Re-evaluate career possibilities as an entrepreneur and working within a startup vs. a large company

- Examine the history of Amazon and its growth from a startup to a global technology giant

Module 11: Startups and Innovation Final Exam and Self-Assessment

- Completion

Career Readiness and Career Exploration

CenterPoint Education

CenterPoint TABE Diagnostics

TABE Aligned Diagnostics

- Completion

GoSkills

Body Language

Body Language: 07 Final Exam

- Completion

Body Language: 01 Introduction to Body Language for Business

- Come across as confident and self-assured in business situations

Body Language: 02 Start to Improve Your Body Language

- Use body language to communicate effectively in meetings and networking situations.

Body Language: 03 Appearances Matter

- Appear poised and relaxed while meeting with clients, attending an event or interacting with customers and colleagues

Body Language: 04 Getting in Front of People

- Use body language to communicate effectively in meetings and networking situations

Body Language: 05 The Toughest Situations: Presentations and Media Interviews

- Deliver a speech and media interview

Body Language: 06 Ensuring Your Future Success

- Communicate clearly and skillfully in any industry or walk of life

Public Speaking

Public Speaking: 01 Creating Your Presentation

- Write a speech using relevant examples to illustrate your points

Public Speaking: 02 PowerPoint Presentations

- Deliver a successful presentation for work, school or personal interest

Public Speaking: 03 Public Speaking Mechanics

- Overcome my nerves and get my message across clearly
- Positively interact with my audience
- Manage a disruptive audience member

Public Speaking: 04 How To Tell Stories

- Deliver a speech that commands my audience's attention

Public Speaking: 05 Conclusion

- Continuously improve my public speaking skills

Public Speaking: 06 Final Exam

- Completion

Indigo Project

Indigo Pathway Survey

Indigo Pathway Survey

- Analyze individual goals and interests
- Determine individual talents, abilities, and skills
- Develop an individual career plan
- I successfully completed my Indigo Pathway Survey and can access my results.
- I can find the Results Summary section of my Indigo report and can explain the job strategy based on my results.
- I can analyze my individual goals and interests and explain how my Top Two motivators show up in my life.
- I can find my DISC Profile on my Indigo report and can describe how my DISC scores influence my talents, abilities, and skills.
- I have researched potential careers and can name a career path that aligns with my personal interests and goals.

- I understand how my communication style may affect my relationships and could impact my career and employability skills.
- I have completed my reflection questions and can discuss my thinking with a friend.

Lifelong Skills

Lifelong Soft Skills

Lifelong Soft Skills - Communication

- Define the three types of communication styles.
- Describe the five steps to achieve great communication.
- Identify and explain the three types of listeners.

Lifelong Soft Skills - Conflict

- Describe conflict management styles.
- Describe characteristics of people who manage conflict well.
- Successfully manage conflict.

Lifelong Soft Skills - Diversity and Inclusion

- Define diversity and inclusion.
- Recognize how diversity and inclusion positively impacts the workplace as a whole.

Lifelong Soft Skills - Ethical Character

- Define ethical character.
- Recognize how ethical character positively impacts the workplace as a whole.
- Apply ethical character to my job.

Lifelong Soft Skills - Flexibility

- Define flexibility.
- Recognize how flexibility positively impacts the workplace as a whole.
- Apply flexibility to my job.

Lifelong Soft Skills - Humility

- Define humility.
- Recognize how humility positively impacts the workplace as a whole.
- Apply humility to my job.

Lifelong Soft Skills - Initiative

- Define initiative.

- Recognize how initiative positively impacts the workplace as a whole.
- Apply initiative to my job.

Lifelong Soft Skills - Personal judgment

- Define personal judgement.
- Recognize how personal judgement positively impacts the workplace as a whole.
- Apply personal judgement to my job.

Lifelong Soft Skills - Positive Attitude

- Define positive attitude.
- Recognize how positive attitude positively impacts the workplace as a whole.
- Apply positive attitude to my job.

Lifelong Soft Skills - Problem solving

- Define problem solving.
- Recognize how problem solving positively impacts the workplace as a whole.
- Apply problem solving to my job.

Lifelong Soft Skills - Self-confidence

- Define self-confidence.
- Recognize how self-confidence positively impacts the workplace as a whole.
- Apply self-confidence to my job.

Lifelong Soft Skills - Teamwork

- Define teamwork.
- Recognize how teamwork positively impacts the workplace as a whole.
- Apply teamwork to my job.

Lifelong Soft Skills - Time Management

- Define time management.
- Recognize how time management positively impacts the workplace as a whole.
- Apply time management to my job.

Lifelong Soft Skills - Work Ethic

- Define work ethic
- Define positive work ethic
- Understand different work ethic styles

Open Textbooks

Be the Boss of Your Career: A Complete Guide for Students & Grads

Be the Boss of Your Career: CH 00 - Introduction

- Completion

Be the Boss of Your Career: CH 01 - Discover Your Career Self

- Recognize and assess your interests, values, and skills.
- Brainstorm and identify your past accomplishments and areas of strength.
- Learn about the benefits of labour market research and how to conduct it when exploring your options.
- Define some of your career targets, set goals, and start to develop a plan to pursue them.

Be the Boss of Your Career: CH 02 - Revitalize Your Job Search Documents

- Identify professional, industry-specific language and keywords.
- Brainstorm and write strong work descriptions and accomplishment statements.
- Prepare and develop an effective and tailored resume and cover letter.
- Present and collect the appropriate reference information.
- Understand the benefits and uses of portfolios.

Be the Boss of Your Career: CH 03 - Diversify Your Job Search Strategy

- Recognize how to manage your job search and reduce your stress.
- Learn how and where to look for a job.
- Understand the value of using multiple methods of job searching.
- Create and utilize an effective networking strategy.
- Use online profiles to expand your network and increase your job search success.
- Identify ways of gaining practical experience.

Be the Boss of Your Career: CH 04 - Master Your Interview Skills

- Understand what is required before, during, and after your interview.
- Be aware of your non-verbal communication skills.
- Identify the various types of interviews and interview questions.
- Learn about professional interview attire.
- Recognize and prepare effectively for common interview questions.

Be the Boss of Your Career: CH 05 - Career Management: Retain, Gain & Maintain

- Understand the major benefits of retaining employment.
- Learn the necessary strategies to help you remain employed.
- Assess areas in which you can improve on in order to increase your job retention.

Be the Boss of Your Career: CH 06 - International Job Seekers & Job Seekers with Disabilities

- Learn about cultural adjustment as an international student or job seeker.
- Understand what Canadian employers are looking for and the differences in the Canadian job search process.
- Identify ways of disclosing a disability including if, when, and how to disclose a disability.

CESBA Digital Literacy Curriculum

DLC12: Learning about Tablets

- Understand the basics of Learning about Tablets

DLC15: Learning about Online Safety

- Understand the basics of Learning about Online Safety

DLC01: Looking at My Computer

- Understand the basics of Looking at My Computer

DLC02: Looking on the Internet

- Understand the basics of Looking on the Internet

DLC03: How do I print part of a page on a website?

- Understand the basics of How do I print part of a page on a website?

DLC04: Looking at a Website

- Understand the basics of Looking at a Website.

DLC05: Looking for a Job

- Understand the basics of Looking for a Job

DLC06: Learning about Folders and Images

- Understand the basics of Learning about Folders and Images

DLC07: Learning about Email

- Understand the basics of Learning about Email

DLC08: Learning about Places to Use a Computer

- Understand the basics of Learning about Places to Use a Computer.

DLC09: Learning about Google Maps

- Understand the basics of Learning about Google Maps.

DLC10: Learning about Facebook

- Understand the basics of Learning about Facebook.

DLC11: Learning about Smartphones

- Understand the basics of Learning about Smartphones

DLC13: Learning about YouTube

- Understand the basics of Learning about YouTube

DLC14: Learning about Skype

- Understand the basics of Learning about Skype

DLC16: Personal and Private Information Online

- Understand the basics of Personal and Private Information Online

DLC17: Learning about Microsoft Word (MS Word)

- Understand the basics of Learning about Microsoft Word (MS Word)

DLC18: Learning about Notepad

- Understand the basics of Learning about Notepad

Education & Training

Anywhere Anytime

Creating the Anywhere, Anytime Classroom

Creating the Anywhere, Anytime Classroom

- Completion

Delivering Engaging Learning Activities in a DEL Culture

Delivering Engaging Learning Activities in a DEL Culture

- Completion

Formative Assessments in a Digital Learning Environment

Formative Assessments in a Digital Learning Environment

- Completion

Interventions and Learning Extensions with DEL

Interventions and Learning Extensions with DEL

- Completion

The Planning Process and DEL

The Planning Process and DEL

- Completion

Certify ED

Early Childhood Education (Video & VR)

Early Childhood Education - Unit 01 - Career Paths in Early Childhood Education: Opportunities, Roles, and Responsibilities

- Identify the importance and legal mandates of confidentiality in early childhood education.
- Identify the professional development resources available, and the need for self-assessment for continued professional growth in the early childhood education field.
- Identify personal characteristics required of an early childhood professional, and the skills and dispositions necessary to communicate and work in a team environment.
- Identify methods of compliance with licensing laws and regulations governing child-caregivers.
- Identify early childhood education career opportunities that are available with a certificate.
- Identify early childhood education career opportunities that are available with a degree.
- Explore and examine opportunities for employment and entrepreneurial endeavors within a variety of early childhood care and education settings.

- Identify the important role child-caregivers play in the development of each child in care.
- Examine the NAEYC accreditation standards for early childhood classrooms.
- Identify recordkeeping and clerical functions in a childcare setting.
- Explain the role of a child advocate.

Early Childhood Education - Unit 02 - Creating a Safe and Secure Early Childhood Learning Environment

- Identify safety hazards in and around the childcare setting.
- Identify the characteristics of appropriate adult supervision in both indoor and outdoor environments.
- Instruct children in personal safety awareness.
- Demonstrate the procedures to follow for accidents, medical emergencies, fire and natural disaster, and environmental alerts.
- Examine examples of accident and injury reports to understand important components of such reports.
- Describe safety procedures for arrival and departure, loading and unloading of children from transportation and the appropriate use of child passenger restraints.
- Examine guidelines that protect the use of children's identity and images on the internet, in social media, and other publication outlets that may be in use in the childcare or learning setting.
- Investigate the legal issues resulting from a failure to provide a safe environment for children in an early childhood care and education setting.

Early Childhood Education - Unit 03 - Health and Safety in Early Childhood: Prevention, Identification, and Response

- Describe the five methods of disease transmission.
- Identify the four stages of an illness.
- Describe universal/standard precautions and infection control.
- Demonstrate healthy environment by implementing health and sanitation habits for and with children to limit cross contamination in a childcare or other schooling environment.
- Examine procedures for maintaining health and vaccination records.
- Follow and understand how to complete an accident/incident form using established procedures.

- Review appropriate methods of distributing and review policies for safe storage of medication.
- Identify the components of and perform a "10 second health check" for children.
- Identify characteristics of common childhood illnesses.
- Describe the three components of the communicable illness process.
- Identify places where pathogens are commonly found.

Early Childhood Education - Unit 04 - Health and Safety in Early Childhood: Promoting Well-being and Protection

- Describe when and where disinfectants solutions should be used and safely housed in classrooms.
- Explain rest and relaxation techniques.
- Identify the nutritional needs of children infants through school age (birth through age eight).
- Describe the process, safety factors, and recommended timelines to consider for introducing solid foods to an infant based on guidance from the American Academy of Pediatrics.
- Plan, prepare, and explain the importance of nutritionally balanced meals and snacks.
- Describe safe and sanitary food service habits in assisting with mealtime routines.
- Identify foods that are potentially dangerous for young children to consume.
- Describe how to encourage positive food choices and good eating habits for toddlers through school-age children.
- Identify signs of abuse and neglect including conditions that may be in place in environments where abuse may be more likely to occur.
- Describe characteristics of those who commit abusive acts and characteristics of abused or neglected children.
- Evaluate how child abuse affects child behavior, health, and the ability to learn and develop.
- Discuss strategies for supporting the needs of children who have experienced abuse or neglect.
- Explain the role of the mandated reporter in reporting suspected child abuse.
- Identify guidelines and procedures for reporting child abuse and neglect.

Early Childhood Education - Unit 05 - Observing and Assessing Young Children: A Developmental Approach

- Describe how major theories of human development provide a basis for planning an environment for developmentally appropriate activities.
- Explain the stages of cognitive development and how they correlate to social, emotional, and physical development.
- Identify reasons why practitioners and other support personnel in schools and childcare centers observe young children.
- Discuss the importance of observing child interactions, children's strengths and weaknesses in and across domains, children's reactions to curriculum implementation, and children's behaviors within the general education classroom.
- Determine factors in choosing a method of assessment to document children's development and identify the advantages and disadvantages of the different approaches to and methods of observation.
- Interpret whether that child is developing typically, using data collected on a particular area of that child's development. Explain why that particular assessment approach was the most effective for interpreting this child's development.

Early Childhood Education - Unit 06 - Cognitive Development in Early Childhood: Building the Foundation for Learning

- Describe equipment and activities that promote cognitive development.
- Examine how a caregiver can plan to meet the social, emotional, physical and cognitive needs of school-age children.
- Explore how experience influences the brain's wiring and development.
- Identify the connections between the brain and other areas of child development, such as: physical well-being, attachment, play, consistency, stress, and trauma.
- Describe the basic processes and timeline of brain development.
- Analyze the role language and communication plays in the cognitive development in young children.
- Explain the stages of language acquisition.
- Explain strategies to encourage expressive and receptive language.
- Describe the importance of vocabulary development in young children.
- Describe factors that influence language development.

Early Childhood Education - Unit 07 - Nurturing Holistic Development: The Power of Story, Literacy, and Physical Play

- Describe various methods of story presentation.
- Evaluate the characteristics of a high-quality children's book using developmentally appropriate guidelines.
- Describe the importance of reading to children from infancy through childhood.
- Identify characteristics of a classroom environment that promotes emergent literacy.
- Describe the stages of physical development.
- Explain the stages of fine and gross motor development.
- Recognize the factors that impact physical development.
- Describe strategies and conditions that encourage physical development
- Describe the effects of play on children's physical development.
- Explain how to select and use appropriate equipment and materials which promote physical development.
- Explain how physical development correlates to social, emotional, and cognitive development.

Early Childhood Education - Unit 08 - Nurturing Social and Emotional Development: Guiding Young Children's Growth

- Describe the social and emotional characteristics of children ages birth to eight.
- Demonstrate effective, positive guidance techniques for guiding behavior.
- Discuss caregiving techniques that develop appropriate social skills.
- Identify positive techniques for conflict resolution and mediation.
- List strategies to promote self-help skills and autonomy.
- Describe the stages of social and emotional development of children.
- Recognize the factors that impact social and emotional development.

Early Childhood Education - Unit 09 - Building Partnerships and Nurturing Growth: Family Engagement and Classroom Environments

- Describe the importance of cooperative relationships with families.
- Identify and plan methods of family and community involvement.
- Describe the components of effective school and home communication.
- Identify key intentional practices and strategies to become acquainted with the family; describe ways parents can be involved in the program; ways to share goals for the child with the family and teacher, and curriculum objectives.

- Model and implement effective communication skills to use with personnel and parents and guardians of children.
- Identify ways that the activity/interest centers and learning stations enhance the development of children.
- Describe and set up activity/interest centers and learning stations within a well-organized, developmentally appropriate learning environment.
- Describe the role of play as a basis for learning in infant, toddler, preschool, and elementary age children.
- Examine the teacher's role in play environments.
- Design an early childhood classroom that promotes a healthy and safe physical and psychological environment that promotes development and learning.
- Identify characteristics of a balanced daily schedule including a variety of transition time activities.

Early Childhood Education - Unit 10 - Inclusive Early Childhood Education: Differentiated Instruction and Curriculum

- Evaluate strategies to adapt the learning environment for children with special needs.
- Demonstrate the ability to identify children's needs, interests, and abilities.
- Identify characteristics of children with exceptionalities across the major exceptionality categories (intellectual, physical, behavioral, social, and emotional concerns), including the gifted child.
- Examine practices to differentiate the learning environment and curriculum to accommodate special needs.
- Identify the components of a well-designed lesson plan.
- Explain how to design and plan sensory activities with supporting materials.
- Investigate developmentally appropriate materials, lessons, and activities that promote children's respect for diversity.
- Examine practices that include but are not limited to, multicultural, and linguistic diversity in early childhood education.
- Examine practices to include learning diversities in early childhood education.
- Examine a variety of curriculum and instructional models.

Early Childhood Education - Unit Sim

- Understand how to create a curriculum web
- Understand how to create a lesson plan
- Understand room arrangement

Core - LX

Certified Core-LX Teacher V2

Classroom Setup

- Can create and archive classrooms
- Can create student accounts and reset passwords and create groups

Mastery-Based Learning Management Workflows

- Can create a progression of badges in a classroom
- Can interpret the data in the Badge Progress report
- Can open a student's playlist and view assignment reports, then based on performance, grant a retry, or override and pass.
- Can provide a counter-evaluation of a student self-evaluation
- Can configure and publish the evaluation report for a student and group
- Can export a group report and individual reports
- Can find the CLR and explain it to a parent
- Can grant a badge based on the data in the mastery report

My First Badge

- Complete a Discussion
- Complete an Interactive Lesson
- Complete a Self-Evaluation
- Submit an Assignment
- Complete a Quiz

Setting up Mastery Progressions with Badges

- Can filter the grade book by assignment, users, groups and dates, and can generate a data report
- Can help students complete all types of learning activities
- Can use the grader or grade book to review student work and assign a score to all types of learning activities
- Can search for and add badges in the classroom

Core-LX

Certified Core-LX Teacher

1. Classroom Setup

- Can create student accounts and reset passwords and create groups
- Can create and archive classrooms

2. Setting up Mastery Progressions with Badges

- Can search for and add badges in the classroom
- Can help students complete all types of learning activities
- Can filter the grade book by assignment, users, groups and dates, and can generate a data report
- Can use the grader or grade book to review student work and assign a score to all types of learning activities

3. Mastery-Based Learning Management Workflows

- Can create a progression of badges in a classroom
- Can export a group report and individual reports
- Can configure and publish the evaluation report for a student and group
- Can provide a counter-evaluation of a student self-evaluation
- Can open a student's playlist and view assignment reports, then based on performance, grant a retry, or override and pass.
- Can interpret the data in the Badge Progress report
- Can grant a badge based on the data in the mastery report
- Can find the CLR and explain it to a parent

4. Instructional Design and Content Creation

- Can create a rubric
- Can create a Playlist
- Can search for, favorite, and use a learning object from Core Collection
- Can create an Assignment Learning Object
- Can create an Assessment using a range of item types
- Can create an interactive lesson
- Can create a discussion learning object
- Can create a badge stack and badge

Core-LX Student Onboarding

Student Playlist Demo

- Do a Self-Evaluation
- Mark Complete an Information page
- Submit Assignments
- Submit Auto-Scored and Teacher Scored Quiz items
- Can submit a discussion
- Submit an interactive lesson with mixed auto-scored and teacher scored items

Student Tutorials

- nan

Transitioning to Quality Online Teaching (MASTER)

Final Assignment

- H6 The online teacher creates, selects, and organizes appropriate assignments and assessments to align curricular content with associated standards-based learning goals.
- H4 The online teacher is able to incorporate subject-specific and developmentally appropriate digital learning resources into online learning modules.
- B1 The online teacher uses digital pedagogical tools that support communication, productivity, collaboration, analysis, presentation, research, content delivery, and interaction.
- B2 The online teacher incorporates discipline-specific technologies, tools, and resources to meet individualized learner needs.
- B3 The online teacher uses different types of tools to interact in online courses in order to nurture learner relationships, encourage learner interaction, and monitor and motivate learner engagement.
- C1 The online teacher employs learner-centered instructional strategies and current practices that leverage technology for learner collaboration
- C3 The online teacher develops a community among culturally diverse learners by providing opportunities for interaction that are conducive to active learning.
- C4 The online teacher promotes learner-learner interaction in online groups in order to foster collaboration and promote higher-order thinking skills such as analysis, synthesis, and/or evaluation.

- D1 The online teacher uses digital tools to identify patterns in learner engagement and performance that will inform improvements to achieve individual learner growth.
- D4 The online teacher establishes relationships through timely and encouraging communication, using various formats.
- H1 The online teacher designs learning experiences that use technology to efficiently engage learners.
- H2 The online teacher uses a formative approach to lesson design.
- H3 The online teacher incorporates diverse media into online learning modules.
- H5 The online teacher continuously reviews and aligns all course content with applicable course objectives and standards.

Incorporating Digital Video into Online Classes

- 1. How well do you understand strategies for incorporating digital video into asynchronous or blended classes.
- 2. Do you feel confident you can locate or create recorded videos that can be incorporated into courses you teach remotely?

Incorporating Social and Emotional Learning into Remote Teaching Practices

- 2. Do you think you can take into account social and emotional learning (SEL) principles when teaching remotely?
- 1. How well do you understand the competencies that define social and emotional learning (SEL)?

Introduction to Learning Design

- 1. How well do you understand principles related to Understanding by Design (UbD)?
- 2. How well do you understand principles related to Universal Design for Learning (UDL)?
- 3. Do you feel ready to incorporate learning design principles into your remote teaching practice?

Introduction to the Course

- H6 The online teacher creates, selects, and organizes appropriate assignments and assessments to align curricular content with associated standards-based learning goals.
- H1 The online teacher designs learning experiences that use technology to efficiently engage learners.
- H2 The online teacher uses a formative approach to lesson design.

- D4 The online teacher establishes relationships through timely and encouraging communication, using various formats.
- D1 The online teacher uses digital tools to identify patterns in learner engagement and performance that will inform improvements to achieve individual learner growth.
- C4 The online teacher promotes learner-learner interaction in online groups in order to foster collaboration and promote higher-order thinking skills such as analysis, synthesis, and/or evaluation.
- C3 The online teacher develops a community among culturally diverse learners by providing opportunities for interaction that are conducive to active learning.
- C1 The online teacher employs learner-centered instructional strategies and current practices that leverage technology for learner collaboration
- B3 The online teacher uses different types of tools to interact in online courses in order to nurture learner relationships, encourage learner interaction, and monitor and motivate learner engagement.
- B2 The online teacher incorporates discipline-specific technologies, tools, and resources to meet individualized learner needs.
- B1 The online teacher uses digital pedagogical tools that support communication, productivity, collaboration, analysis, presentation, research, content delivery, and interaction.
- H5 The online teacher continuously reviews and aligns all course content with applicable course objectives and standards.
- H3 The online teacher incorporates diverse media into online learning modules.
- H4 The online teacher is able to incorporate subject-specific and developmentally appropriate digital learning resources into online learning modules.

Leveraging the Power of Online Discussion Boards

- 1. How confident are you using online discussion board tools?
- 2. How well do you understand different sorts of pedagogies that can be applied when using online discussion boards?

Protecting Student Data Privacy When Teaching Remotely

- 1. How well do you understand what constitutes personally protected information (PII) and why it should be protected?
- 2. How well do you understand rules that are part of FERPA and COPPA federal legal guidelines for student data security?

- 3. How well do you think you are prepared to handle data privacy issues when you next teach remotely?

Supporting and Transforming Education with Technology

- 1. How effectively do you currently use educational technology?
- 2. How much experience do you have locating, evaluating and implementing new educational technologies?
- 3. Do you have a framework for understanding how technology integration can impact student learning?

Synchronous and Asynchronous Teaching and Learning

- 1. How well do you understand the distinction between synchronous, asynchronous, and blended teaching and learning?
- 2. How well do you understand the benefits and challenges of different teaching modalities (synchronous, asynchronous and blended)?
- 3. Do you feel ready to make choices about your remote teaching strategy based on your understanding of different teaching modalities (synchronous, asynchronous and blended)?

Using Video when Teaching Synchronously

- 3. Do you feel ready to incorporate best practices regarding audio, video and professionalism into your use of video conferencing products to teach remotely?
- 1. How comfortable do you feel using video conferencing tools like Zoom or Google Meet?
- 2. How well do you understand principles of safety and security when using video conferencing products to teach remotely?

Tutorial First-Time Orientation Badge

0. My First Badge

- Complete a Quiz
- Submit an Assignment
- Complete a Discussion
- Complete an Interactive Lesson
- Complete a Self-Evaluation

Open Textbooks

Introduction to Education

IE 01 - Why Teach?

- Understand that the decision to teach is motivated by both intrinsic and extrinsic rewards
- Identify reasons for teaching
- Define the role of a teacher in current society

IE 02 - What is the Purpose of School?

- Understand the basic purposes of school
- Describe several different understandings of the concept of "school"
- Define the nature of school for each level: elementary, middle, and high schools

IE 03 - Who are Today's Students?

- Discuss the predominant issues and societal trends confronting contemporary education.
- Identify diversity and how it impacts education
- Explain how the role of the teacher both is impacted and impacts how children are served in the school

IE 04 - How Do Social Issues Affect Students?

- Identify critical social issues that directly influence the students' academic success in the classroom
- Describe the impact poverty has on a student's potential for success in schools
- Define the role of communication between the school and family

IE 05 - What is an Educational Philosophy?

- Define, describe, and identify the four branches of educational philosophy
- Outline at least two educational philosophies that influence our schools
- Explain how educational philosophies influence the choice of curriculum and classroom instructional practices
- Develop a personal philosophy concerning teaching and learning

IE 06 - Excellence or Equity? Which is More Important?

- Identify the historical struggles for equity and excellence in education
- Describe the impact of tracking students in education

- Provide a brief overview of the struggles for equal educational opportunities for identified groups of students

IE 07 - What are the Ethical and Legal Issues in Schools?

- Distinguish the difference between laws and ethics and explain how both are necessary for teachers
- Identify several ways that ethics are involved with teachers day to day activities
- Describe the hierarchy of school systems
- Identify several key areas of the law related to student and teachers

IE 08 - What is Taught?

- Name the major subject-matter areas taught in elementary and secondary schools
- Identify curriculum standards and how they are used to plan lessons
- Describe how educators can differentiate curriculum to meet student needs

IE 09 - What is a Positive Classroom Environment?

- Identify basic classroom management principles for learning and academic achievement
- Name several steps to respond to conflicts and behavior issues in the classroom

IE 10 - What Makes an Effective Teacher?

- Define learning as it relates to effectiveness as an educator
- Identify the four domains of Danielson's Frameworks for Teaching and how they relate to teacher effectiveness
- Describe what it meant by the teacher as a "reflective decision maker"

IE 11 - What Can a New Teacher Expect?

- Discuss why the act of instructing students can be a stumbling block for new teachers.
- Explain why new teachers often have difficulties with parents who should be their natural allies.
- Summarize the chief strategies that can contribute to a successful first year of teaching

Pointful Education

Early Childhood Education I

EarlyChildEd_01 00: Module 0

- Completion

EarlyChildEd_01 01: The Early Childhood Education Profession

- Identify early childhood education career opportunities
- Compare roles and responsibilities of the childcare center team members
- Identify the important role childcare givers play in the development of each child in care
- Describe the need for quality childcare and the benefits to children, families, and communities
- Discuss the evolution of the childcare industry

EarlyChildEd_01 02: Planning a Safe, Clean, and Healthy Learning Environment

- Identify and describe characteristics of a safe, sanitary, healthy childcare environment.
- Describe ways to assist children with personal hygiene routines.
- Recognize potential safety and fire hazards and develop a procedure to prevent accidents.
- Identify and describe regulations for transporting children.
- Outline the steps for proper use of fire extinguishers (i.e.: students watch a video, observe someone else demonstrate, etc.).
- Follow and understand how to complete an accident/incident form using established procedures.
- Identify and describe components of a playground safety checklist.
- Summarize best practices within the center to conserve environmental resources.
- Discuss methods to promote positive attitudes and skills for daily routines for children.

EarlyChildEd_01 03: Planning Food Service & Nutrition

- Identify the nutritional needs of infants through school age children (birth through age eight).
- Identify and plan nutritious snacks and meals for infants through school age children (birth through age eight).
- Describe safe and sanitary food service habits in assisting with mealtime routines.
- Identify foods that are potentially dangerous for young children's consumption (including common allergens like peanuts).
- Describe how to encourage positive food choices and good eating habits for toddlers through school age children.
- Use United States Department of Agriculture (USDA) current guidelines as a tool for planning nutritious meals.
- Identify guidelines for purchasing, receiving, storing, and safety of foods as defined in Department of Children and Families administrative rule.

- Recognize age appropriate nutrition education activities.

EarlyChildEd_01 04: Typical & Atypical Development

- Compare and contrast the characteristics of typical and atypical development.
- Describe the principles and stages of development.
- Describe the characteristic of children ages birth to eight in the following domains: physical development; approaches to learning; social and emotional; language and communication; and cognitive development and general knowledge.
- Discuss circumstances and factors that put a child at risk for developmental delays.
- Identify and describe theories of human development including cognitive psycho-social, socio-cultural, psychoanalytical, and behaviorist.
- Create a developmentally appropriate learning activity.

EarlyChildEd_01 05: Observation & Recording Methods

- Identify the steps for conferring with parents when a developmental delay is suspected.
- Discuss the importance of confidentiality of child/family records.
- Discuss the importance of including the family in the collection of information for observations.
- Identify observation techniques and methods used in a childcare setting.
- Discuss the differences between observations, screenings, developmental assessments, and developmental evaluations.

EarlyChildEd_01 06: Methods of Guidance

- Identify and describe methods of guidance of children's behavior at age-appropriate levels.
- Differentiate methods of direct and indirect guidance (i.e.: concepts of room arrangements, transitions, routines, etc.).
- Distinguish between appropriate/inappropriate methods of guiding behaviors by the childcare professional.
- Discuss the importance of communicating with families regarding expectations of children's behavior (i.e.: NAEYC and DAP, etc.) guidelines.

EarlyChildEd_01 07: The Influences of Nutrition, Environment, and Heredity

- Identify and describe symptoms of childhood illness and communicable diseases.
- Identify characteristics of a healthy child.
- Describe ways in which the spread of disease in childcare settings can be prevented.

- Demonstrate how to communicate with parents who continue to send children to childcare when they are sick.
- Identify the components of and perform a 10 second health check for children.
- Investigate current information on child nutrition, the environment, heredity and discuss their effect upon the development of a child.
- Discuss how a child's health status influences development.
- Describe the importance of physical fitness to health status and development.

EarlyChildEd_01 08: Current and Future Technology in Childcare

- Demonstrate appropriate use of technology by childcare professionals (i.e.: online assessments, lesson plans, presentation software, etc.).
- Analyze appropriate uses of current technology in a childcare setting.
- Describe the use of robotic technology for young children.
- Evaluate the opportunities and challenges of screen time on young children.
- Discuss the pros and cons of video surveillance at childcare centers.

EarlyChildEd_01 09: Exploring Your State: Child Abuse and Neglect

- Describe the characteristics of abusers.
- Identify the most common physical and behavioral indicators of physical abuse, sexual abuse, emotional abuse and neglect.
- List the factors, multiple forces, and most common risk factors for child abuse and neglect.
- Discuss the impacts and effects of child abuse and neglect.
- Identify local community resources that provide help for the abused and the abuser.
- Recognize the reporting requirements of at-risk children (i.e.: children in protective services, human trafficking, etc.).
- Identify the examples of human trafficking and the physical and behavioral indicators associated.
- Describe physical abuse, physical neglect, sexual abuse, and emotional abuse as defined by your state's law.
- Discuss the data regarding statistics as they pertain to child abuse at state and national levels.
- Describe the legal requirement and protection provided to childcare workers in reporting suspected child abuse and neglect according to Florida law (ie. Mandatory reporting, etc.) or the state of residence. Identify state and local guidelines and procedures for reporting child abuse and neglect.

- Identify the necessary information for completing a mock report of child abuse and neglect and how to submit the report.

EarlyChildEd_01 10: Exploring Your State: Rules and Regulations in Childcare

- Recognize the stakeholders in the childcare profession (i.e.: ELC, licensing, agencies, etc.)
- Identify the different types of childcare facilities and licensing requirements
- Identify the components of your state's statutes as they relate to areas of childcare standards
- Identify local and state licensing agencies and their responsibilities
- Identify local and state fire, safety, sanitation, and health regulations
- Identify minimum state standards for screening owners, operators, staff, and volunteers of childcare centers
- Identify and discuss current childcare issues and proposed laws and ordinances that govern state and local licensing and inspection of childcare facilities
- Identify information concerning child discipline in state rules
- Identify methods of compliance with rules and regulations governing childcare givers

EarlyChildEd_01 11: Course Wrap-up/Final Exam

- Completion

Early Childhood Education II

EarlyChildEd_02 00: Module 0

- Completion

EarlyChildEd_02 01: Professionalism Part I

- Explain the importance of professional development, ethical standards, accreditation, confidentiality, credentialing, professional organization membership/participation, and self-reflection for childcare professionals.
- Identify and use job-related childcare terminology.
- Participate in regular self-assessment including attitude and performance.
- Demonstrate exemplary behavior and social skills as a positive role model for children.

EarlyChildEd_02 02: Professionalism Part II

- Distinguish between professional and unprofessional behavior when serving as a role model for children.

- Describe legal issues and liability as they relate to childcare professionals (i.e.: social media posts, confidentiality, etc.).
- Identify and review resources on the National Association for the Education of Young Children Website (www.naeyc.org).
- Observe teaching situations depicting ethical problems and use the NAEYC Code of Ethics to propose potential solutions.
- Identify and describe various teaching methods and learning styles for effective teaching practices.

EarlyChildEd_02 03: Observation and Recording Methods and the History of School-Age Childcare

- Analyze appropriate observation methods and tools for recording (i.e.: anecdotal records, running records, checklists, etc.).
- Observe, record, and report the behavior of children using various observation tools.
- Describe the need for school-age childcare and how it has evolved.
- Describe different types of programs available for children before and after school; during summer; and on school holidays.
- Explain the professional characteristics of a school-age caregiver.

EarlyChildEd_02 04: The History of School-Age Childcare

- Explain why and how individual children may overlap both younger and older chronological programs.
- Examine how a caregiver can plan to meet the social, emotional, physical and cognitive needs of school-age children.
- Discuss the School Age Professional Certificate Credential.

EarlyChildEd_02 05: Developmentally Appropriate Care and Activities for Infants and Toddlers

- Explain visual, auditory, olfactory, gustatory, and tactile stimulation activities.
- Describe and plan activities that stimulate gross and fine motor development.
- Identify age-appropriate nutritional snacks.
- Review appropriate feeding, diapering, toilet training, bathing, dressing, and grooming techniques.
- Demonstrate/simulate sanitary procedures in feeding, changing diapers, toileting, and maintaining the environment for infants and toddlers.

EarlyChildEd_02 06: Schedules, Spaces, and Experiences that Enhance Children's Total Growth and Development

- Evaluate all aspects of an environment that provides opportunities for children to learn through their play.
- Assist with planning and evaluating schedules that include active and quiet times, individual, small, and large group experiences, as well as, child and adult initiated activities.
- Implement techniques for facilitating children's successful participation in all aspects of a program.
- Describe how major theories of human development provide a basis for planning a program.

EarlyChildEd_02 07: Language Use and Acquisition

- Use an appropriate vocabulary that increases in complexity and variety.
- Describe the importance of vocabulary development in young children.
- Use proper grammar when speaking to parents and/or children.
- Identify the stages of language acquisition.
- Model and reinforce correct grammar.
- Create a lesson or activity that promotes appropriate language acquisition.
- Create a lesson or an activity which promotes vocabulary development.

EarlyChildEd_02 08: DAP for Programs Serving Children Birth Through Age 8

- Followed Guidelines
- Presentation
- Mechanics
- Content

EarlyChildEd_02 09: Professional Relationship Skills

- Identify traits of positive self-image, self-esteem, and self-growth.
- Create intrapersonal goals and exhibit responsibility toward achieving goals.
- Describe and display ways to show empathy, understanding and caring (i.e. bullying, bias, cultural awareness, etc.).
- Identify appropriate strategies that enhance respectful, reciprocal relationships between children, families, and co-workers (i.e. honesty, integrity, etc.).
- Describe the needs and strengths of a diverse workplace.
- Demonstrate effective conflict resolution skills.

EarlyChildEd_02 10: Brain Research and Communication Skills

- Explain common terms and concepts related to brain development and the formation of neuronal connections.
- Use the internet to prepare a list of recent resources pertaining to brain research.
- Identify effective communication skills used with children including interacting positively with each child and dialog with children as a group, using active listening, open-ended questioning, activities, and teachable moments.
- Identify ways to promote positive interaction between the family, childcare professionals, and community (i.e. networking, newsletters, written communication, etc.).

EarlyChildEd_02 11: Preparing for the Child Development Associate Certification

- Portfolio Preparation for the Child Development Associate Certification Exam
- Understand the requirements for the Child Development Associate Certification
- Preparing for the Child Development Associate Certification Exam

EarlyChildEd_02 12: Course Wrap-up/Final Exam

- Completion

Education & Teaching Advanced

Education & Teaching Advanced IET 00: Start Here

- Completion

Education & Teaching Advanced IET 01: The History of Education in the United States

- Construct a timeline of education before 1900 in the United States.
- Identify key changes in brick and mortar education through 1960.
- Evaluate the historical events which impacted brick and mortar education from 1960 to the present day.
- Analyze the impact of the introduction of various technologies to brick and mortar education.
- Understand the present-day structure of federal and state government as it pertains to education.

Education & Teaching Advanced IET 02: An Introduction to Distance Learning

- Construct a timeline of distance education from its beginnings to the present day.
- Evaluate the differences between face-to-face instruction and distance learning.

- Identify the key features of various Learning Management Systems and Student Information Systems required for distance learning.
- Outline the key components in online learning from organizations such as iNACOL and Quality Matters.
- Compare and contrast digital learning within K-12 and Higher Education.

Education & Teaching Advanced IET 03: Blended, Personalized and Adaptive Learning

- Define blended learning and its various instructional models.
- Define personalized learning and its various instructional models.
- Define adaptive learning and its various instructional models.
- Compare and contrast blended, personalized and adaptive learning.
- Discuss the systems available to support blended, personalized, and adaptive learning.

Education & Teaching Advanced IET 04: Augmented and Virtual Reality in Education

- Define key terms related to AR/VR in education
- Evaluate applications of AR/VR in education in the classroom and in corporate training
- Predict when they will first use AR/VR in school
- Determine the impact that learning using AR/VR could have on educational outcomes
- Discuss potential drawbacks and distractions that AR/VR could cause in education
- Identify potential career opportunities within AR/VR in education and educational paths to enter those careers

Education & Teaching Advanced IET 05: Robots at School

- Evaluate various uses of robotics used in education
- Describe how robots are used to assist children with disabilities
- Compare the benefits and limitations of utilizing robots and artificial intelligence in education
- Discuss the impact that robots may have on the teaching profession
- Identify career opportunities in educational robotics and describe how teachers and students can utilize robotics and AI to achieve positive educational outcomes

Education & Teaching Advanced IET 06: Wearable Technology in Education

- Define key terms related to wearable technology in education
- Describe current and potential applications of wearable technology in education for both students and teachers
- Evaluate the use of augmented and virtual reality systems to enhance learning experiences

- Discuss the potential risks and downsides of utilizing wearable technologies for education, such as technical problems, high cost, and cheating
- Examine how wearable technology and AR/VR can contribute to digital distraction and what students can do to increase focus and attention

Education & Teaching Advanced IET 07: Careers in Education

- Describe the education requirements and the role of the teacher in K-12 brick and mortar and distance learning.
- Discuss the education requirements and the role of the administrator in K-12 brick and mortar and distance learning.
- Compare and contrast the education requirements and roles within education technology careers.
- Discuss the education requirements and the role of the counselor in K-12 learning.
- Identify the differences and similarities in the education requirements and roles of the teacher, the administrator, and the counselor between K-12 and Higher Education.

Education & Teaching Advanced IET 08: Future of Education

- Describe how brick and mortar education will change with new and emerging technologies.
- Describe how advances in technology will benefit distance learning.
- Compare and contrast various learning modalities and their impact on the future of education.
- Discuss the possible risks and downsides of relying on technology in education.
- Analyze the global impact of distance learning and its various benefits to countries other than the United States.

Education & Teaching Advanced IET 09: Course Wrap-up / Final Exam

- Completion

Finance

Certify ED

Personal Finance (Video & VR)

Personal Finance - Unit 01 - Taking Control: The Foundation of Personal Finance

- Discuss the importance of taking responsibility for personal financial decisions.

- Identify the importance of financially self-sufficient families to the stability of the economic system.
- Explain how the personal choices people make are interconnected with their financial resources.
- Apply a decision-making process to making consumer choices concerning public transportation and vehicle ownership, including leasing versus owning and new versus used.
- Apply a decision-making process to consumer choices concerning housing, including renting versus owning.
- Describe how shared decision-making regarding income allocation and expenditures works in a family setting.
- Explain the interrelationship of time, effort, and money in achieving personal and family goals.
- Explain how inflation affects spending and investing decisions.
- Identify potential sources of income.
- Explain discretionary and disposable income and how it affects personal and family spending.

Personal Finance - Unit 02 - Career, Education, and Income: Building a Solid Financial Foundation

- Analyze how career choice has an impact on income.
- Analyze how education and technical skills have an effect on income.
- Identify the advantages and disadvantages of dual income families.
- Relate personal income and financial goals to life events.
- Identify the opportunity cost of various financial decisions, including the costs of time, risk, and resources.
- Explain how work ethic, abilities, and attitude are all factors impacting one's employability and earning potential.
- Compute gross pay, payroll deductions, and net pay.
- Demonstrate an understanding of different forms of payment, such as salary, hourly, contract, and 1099s.
- Identify optional and required employee benefits and recognize the value in addition to net pay.

Personal Finance - Unit 03 - Basics of Taxation: From Tax Principles to Return Preparation

- Explain the basic principles of taxation.

- List the types and sources of taxes at the local, state, and federal levels.
- Explain the purposes and types of taxes in the United States, such as progressive, regressive, and proportional taxes.
- Explain how taxes, government transfer payments, and employee benefits relate to disposable income.
- Define basic tax terminology, such as taxable income, tax credits, exemptions, deductions, and itemized deductions.
- Prepare U.S. individual federal income tax return Forms 1040EZ and 1040A.
- Identify penalties related to non-payment of income tax.

Personal Finance - Unit 04 - Managing Your Money: Navigating Financial Institutions and Services

- Explain how to use money-management tools available from financial institutions.
- Evaluate services provided by financial deposit institutions to transfer funds.
- Analyze the role of banks and other financial institutions in the world economy.
- Identify the rules and regulations of financial institutions pertaining to the consumer, including FDIC, Dodd-Frank Act, etc.
- List and explain the types of checking accounts and banking services available to customers.
- Demonstrate knowledge of opening and managing bank accounts to deposit funds for spending and savings.
- Identify various ways to deposit and withdraw funds for bank accounts and verify how to use each method safely, including using a secure network when transmitting pictures of checks for deposit.
- Identify and distinguish between various check endorsements, such as blank, restricted, and special.
- Explain the difference between debit and credit cards.
- Apply simple and compound interest formulas.
- Explain how to balance a checking account.
- Explain the concept of net worth.
- Design a budget plan for earning, spending, and saving.
- Prepare checks and deposit slips.
- Record transactions in checkbook registers and reconcile bank statements.

Personal Finance - Unit 05 - Financial Planning: Saving, Investing, and Retirement

- Explain the degree of diversification based on the investor's risk tolerance.

- Identify and describe various retirement accounts, such as Roth and Traditional IRAs, 401k, and 403b.
- Compare the risk, return, and liquidity of investment alternatives.
- Describe how to buy and sell investments.
- Explain how different factors affect the rate of return of investments.
- Explain how to use the Rule of 72 to evaluate investment choices.
- Explain the purpose of financial planning.
- Explain the relationship between saving and investing.
- Describe reasons for saving and investing.
- Identify and classify investment options, such as stocks, government and corporate bonds, and mutual funds.

Personal Finance - Unit 06 - Investing and Credit: Building Financial Stability

- Identify and evaluate credible sources of investment information.
- Explain how agencies that regulate financial markets protect investors.
- Design a plan for investing to increase net worth.
- Define credit and identify the role consumer credit has in today's economy.
- Compare the advantages and disadvantages of different payment methods and understand the implications of paying minimum balances.
- Analyze the benefits and costs of consumer credit.
- Compare sources of consumer credit.
- Explain factors that affect creditworthiness and the purpose of credit records.
- Explain the components of credit scores.

Personal Finance - Unit 07 - Managing Credit and Debt: A Consumer's Guide

- Identify ways to avoid or correct credit problems.
- Explain the rights and responsibilities of buyers and sellers under consumer protection laws.
- Explain how and who uses your credit report.
- Identify the credit-reporting agencies and demonstrate how to obtain and read a sample credit report.
- Define debt and identify how to effectively balance credit and debt to achieve short-term and long-term goals.
- Explore options for paying for post-secondary education opportunities.
- Analyze the risks and consequences of consumer credit, including bankruptcy, foreclosure, co-signing, lower credit score, and lower credit worthiness.

Personal Finance - Unit 08 - Consumer Protection and Informed Decision-Making

- Identify and explain fraudulent and deceptive business practices.
- Identify and describe wise consumer behavior by classifying the benefits and costs of spending decisions, evaluating information about products and services, and using a rational decision-making model to select one option over another.
- List and describe consumer legislation and sources of consumer protection.
- Describe how to contact public officials to express opinions.
- Explain how consumers can get redress and other ways of finding remedies to consumer problems.
- Explain warranties and the relevance of the Federal Trade Commission.
- Explain how federal student aid is available to help pay for college.
- Describe the effects of advertising on consumer purchases.
- Describe the effects of social media on consumer purchases.
- Demonstrate planned purchasing decisions, factoring in direct costs (price) and indirect costs (e.g. sales/use tax, excise tax, shipping, handling, and delivery charges, etc.) as part of being an informed consumer.

Personal Finance - Unit 09 - Protecting Your Financial Future: Consumer Protection, Identity Theft, and Insurance

- Identify and cite reasons for insurance policy cancellation.
- Describe consumer protections related to debt collection and bankruptcy.
- Describe common ways identity theft happens, such as dumpster diving, skimming, phishing, changing addresses, stealing, and computer hacking.
- Describe ways to deter identity theft by safeguarding information, such as shredding financial documents, protecting Social Security number, not giving out personal information, using secure networks for online banking, and not using obvious passwords.
- Describe ways to detect suspicious activity by routinely monitoring accounts, including reviewing credit reports, online balances, and monthly statements.
- Describe ways to defend against identity theft as soon as theft is suspected.
- Explain how risk is transferred through insurance.
- Define insurability and explain why rates vary.
- Distinguish between insurable and non-insurable risks and the concept of economic loss.
- Examine ways to reduce the cost of insurance.

Personal Finance - Unit 10 - Protecting Your Assets: Understanding Insurance and Risk Management

- Evaluate different types of automobile insurance coverage, including riders and endorsements.
- Describe coverage common to most home and rental insurance policies and explain how the amount of coverage needed is determined.
- Identify and describe basic types of coverage and features offered by health insurance companies.
- Assess the need for umbrella and excess liability insurance coverage.
- Define the responsibility of the insured for co-pay, deductible, and non-covered medical expenses.
- Define Medicaid and Medicare and describe the role of the Consolidated Omnibus Budget Reconciliation Act (COBRA).
- Explain the purpose of life insurance and the basic difference between term and whole life insurance.
- Explain the need for and benefits of disability coverage.
- Explain the role of Social Security in providing disability benefits.
- Explain the role of workers' compensation insurance.
- Define unemployment insurance.

Personal Finance - Unit Sim

- Understand earning income
- Understand opening bank accounts
- Understand managing expenses

GoSkills

Finance for Non-Financial Professionals

Finance for NonF Professionals: 01 Finance Fundamentals

- Understand finance fundamentals: amount, timing, revenues & profits

Finance for NonF Professionals: 02 Financial Reports

- Interpret data on financial reports and how these reports impact each other.

Finance for NonF Professionals: 03 Ratios and Measures

- Formulate strong estimates, and determine when to capitalize and depreciate an asset.

Finance for NonF Professionals: 04 Budgeting

- Identify the different categories of cost accounts for budgeting and tracking spending
- Utilize ratios and measures to gain insight into profitability and performance

Finance for NonF Professionals: 05 Business Case

- Develop a business case to provide rationale for why a project should be undertaken.

Finance for NonF Professionals: 06 Variance and Forecasting

- Understand cost behavior and cost variance reporting.

Finance for NonF Professionals: 07 Final Test

- Completion

Financial Modeling Basics

Financial Modeling Basics: 01 What is Best Practice?

- Understand the four key attributes of a good financial model.

Financial Modeling Basics: 02 Layout Tips

- Use Excel keyboard shortcuts to speed up my modeling
- Layout my model to make it easy to understand and navigate through
- Design my model to separate the inputs and calculations
- Distinguish between formats and styles, and how to import styles into a workbook
- Use number formatting and custom number formats
- Recognize when and how to effectively apply conditional formatting

Financial Modeling Basics: 03 Range Names

- Assign and use range names, add hyperlinks and data validation
- Apply checks to keep my model error free

Financial Modeling Basics: 04 Viewing, Linking, Protection, and Version Control Tips

- Printing and viewing tips, linking tips and security tips to protect my model

Financial Modeling Basics: 05 Key Functions

- Key Excel functions that are essential to know when building a financial model

Financial Modeling Basics: 06 Final Exam

- Completion

Introduction to Data Analysis with Python

Intro to Data Analysis with Python: 04 Pandas Visualization

- Create data visualizations with Pandas.

Intro to Data Analysis with Python: 01 Development Environment Setup

- I can install Python on my operating system.

Intro to Data Analysis with Python: 02 Numpy

- Import and install Numpy.
- Use Numpy arrays, operations, and universal functions.

Intro to Data Analysis with Python: 03 Pandas

- Install Pandas data analysis toolkit.
- Use Pandas series and DataFrames.
- Clean and prepare your data with Pandas DataFrames.

Intro to Data Analysis with Python: 05 Linear Regression With SciKitLearn

- Install SciKitLearn to make predictions using essential machine learning.
- Create and analyze a linear regression model.

Intro to Data Analysis With Python: 06 Final Exam

- Completion

QuickBooks Online

02 QuickBooks Online: Chart of Accounts

- Add, inactivate, edit, and merge accounts.

01 QuickBooks Online: Navigation

- Navigate the Quickbooks Online interface.

03 QuickBooks Online: Products and Services

- Add, inactivate, edit, and merge accounts.

04 QuickBooks Online: Reporting

- Locate, drill down into, and modify reports.

05 QuickBooks Online: Expenses

- Add vendor information.

- Record expenses.

06 QuickBooks Online: Income

- Add customer information.
- Create sales receipts and invoices.
- Deposit combined payments.

07 QuickBooks Online: Banking

- Set up a checking account.
- Transfer funds between balance sheet accounts.
- Locate and modify the bank register.

08 QuickBooks Online: Common Errors

- Identify errors in the bank register and profit & loss report.

09 QuickBooks Online: Final Test

- Completion

Open Textbooks

Introduction to Financial Accounting

Introduction to Financial Accounting

- Understand accounting principles and processes, including defining accounting, recognizing different business forms, explaining GAAP, preparing financial statements, and analyzing transactions using the accounting equation.
- Understand and apply fundamental accounting concepts, including analyzing transactions using double-entry accounting, preparing trial balances, recording transactions in journals and ledgers, and defining the accounting cycle.
- Understand and apply adjusting entries as per GAAP principles, including explaining the need for adjusting entries, preparing entries for various scenarios (prepaid expenses, depreciation, unearned revenues, accrued revenues, and accrued expenses), and preparing and explaining the use of an adjusted trial balance.
- Master the full accounting cycle, from utilizing an adjusted trial balance to preparing financial statements, closing entries, a classified balance sheet, and understanding financial statement disclosures, auditor's reports, and management's responsibilities.
- Evaluate inventory management through different cost flow assumptions (specific identification, FIFO, and weighted average) for both perpetual and periodic systems,

and understand their impact on financial statements, lower of cost and net realizable value adjustments, estimating inventory using the gross profit and retail inventory methods, and calculating merchandise inventory turnover.

- Comprehend internal control concepts as applied to cash, accurately journalize petty cash transactions, and proficiently prepare bank reconciliations, including recording necessary adjustments
- Understand, calculate, and accurately record estimated uncollectible accounts receivable, including write-offs and recoveries, and explain and record short-term notes receivable along with related interest calculations
- Manage and account for various aspects of long-term assets, including determining their cost, calculating depreciation using multiple methods, handling partial-year depreciation, accounting for revised depreciation due to capital expenditures, addressing asset impairments, derecognition of assets, handling intangible assets, recognizing goodwill, and complying with disclosure requirements in the financial statement notes.
- Differentiate between current and long-term liabilities, accurately record and disclose both known and estimated current liabilities, and understand how to calculate and record long-term loans
- Manage corporate organization aspects, including identifying characteristics of the corporate form and share classes, recording and disclosing preferred and common share transactions, cash dividends, and share dividends, as well as calculating and explaining the book value per share ratio
- Understand the significance of the statement of cash flows, be capable of preparing it, and adept at interpreting the statement
- Analyze financial statements, students will learn to use ratio analysis for evaluating liquidity, profitability, leverage, and market performance, as well as apply horizontal and vertical trend analysis.
- Distinguish the characteristics of proprietorships and partnerships, understanding how their financial statements differ from those of corporations

Principles of Accounting

POA01: Role of Accounting in Society

- Explain the importance of accounting and distinguish between financial and managerial accounting
- Identify users of accounting information and how they apply information

- Describe typical accounting activities and the role accountants play in Identifying, recording, and reporting financial activities
- Explain why accounting is important to business stakeholders
- Describe the varied career paths open to individuals with an accounting education

POA02: Introduction to Financial Statements

- Describe the income statement, statement of retained earnings, balance sheet, and statement of cash flows, and how they interrelate
- Prepare an income statement, statement of retained earnings, and balance sheet

POA03: Analyzing and Recording Transactions

- Describe principles, assumptions, and concepts of accounting and their relationship to financial statements
- Define and describe the expanded accounting equation and its relationship to analyzing transactions
- Define and describe the initial steps in the accounting cycle
- Analyze business transactions using the accounting equation and show the impact of business transactions on financial statements
- Use journal entries to record transactions and post to T-Accounts
- Prepare a trial balance

POA04: The Adjustment Process

- Explain the concepts and guidelines affecting adjusting entries
- Discuss the adjustment process and illustrate common types of adjusting entries
- Record and post the common types of adjusting entries
- Use the ledger balances to prepare an adjusted trial balance
- Prepare financial statements using the adjusted trial balance
- Define, explain, and provide examples of current and noncurrent assets, current and noncurrent liabilities
- Use a 10-column worksheet

POA05: Completing the Accounting Cycle

- Describe and prepare closing entries for a business
- Prepare a post-closing trial balance
- Apply the results from the adjusted trial balance to compute current ratio and working capital balance, and explain how these measures represent liquidity
- Complete a comprehensive accounting cycle for a business

POA06: Merchandising Transactions

- Compare and contrast merchandising versus service activities and transactions
- Compare and contrast perpetual versus periodic inventory systems
- Analyze and record transactions for merchandise purchases using the perpetual inventory system
- Analyze and record transactions for the sale of merchandise using the perpetual inventory system
- Analyze and record adjusting entries for the sale of merchandise using the perpetual inventory system
- Discuss and record transactions applying the two commonly used freight-in methods
- Describe and prepare multi-step and simple income statements for merchandising companies
- Analyze and record transactions for merchandise purchases and sales using the periodic inventory system

POA07: Inventory

- Describe and demonstrate the basic inventory valuation methods and their cost flow assumptions
- Calculate the cost of goods sold and ending inventory using the periodic method
- Calculate the cost of goods sold and ending inventory using the perpetual method
- Explain and demonstrate the impact of inventory valuation errors on the income statement and balance sheet
- Examine the efficiency of inventory management using financial ratios

POA08: Fraud, Internal Controls, and Cash

- Analyze fraud in the accounting workplace
- Define and explain internal controls and their purpose within an organization
- Describe internal controls within an organization
- Define the purpose and use of a petty cash fund, and prepare petty cash journal entries
- Discuss management responsibilities for maintaining internal controls within an organization
- Define the purpose of a bank reconciliation, and prepare a bank reconciliation and its associated journal entries
- Describe fraud in financial statements and sarbanes-oxley act requirements

POA09: Accounting for Receivables

- Apply revenue recognition principles to long-term projects
- Explain how notes receivable and accounts receivable differ
- Discuss the role of accounting for receivables in earnings management
- Determine the efficiency of receivables management using financial ratios
- Explain the revenue recognition principle and how it relates to current and future sales and purchase transactions
- Account for uncollectible accounts using the balance sheet and income statement approaches

POA10: Long-Term Assets

- Distinguish between tangible and intangible assets
- Analyze and classify capitalized costs versus expenses
- Explain and apply depreciation methods to allocate capitalized costs
- Describe accounting for intangible assets and record related transactions
- Describe some special issues in accounting for long-term assets

POA11: Current Liabilities

- Identify and describe current liabilities
- Analyze, journalize, and report current liabilities
- Define and apply accounting treatment for contingent liabilities
- Prepare journal entries to record short-term notes payable
- Record transactions incurred in preparing payroll

POA12: Long-Term Liabilities

- Explain the pricing of long-term liabilities
- Compute amortization of long-term liabilities using the effective-interest method
- Prepare journal entries to reflect the life cycle of bonds

POA13: Corporation Accounting

- Explain the process of securing equity financing through the issuance of stock
- Analyze and record transactions for the issuance and repurchase of stock
- Record transactions and the effects on financial statements for cash dividends, property dividends, stock dividends, and stock splits
- Compare and contrast owners' equity versus retained earnings
- Discuss the applicability of earnings per share as a method to measure performance

POA14: Statement of Cash Flows

- Explain the purpose of the statement of cash flows
- Differentiate between operating, investing, and financing activities
- Prepare the statement of cash flows using the indirect method
- Prepare the completed statement of cash flows using the indirect method
- Use information from the statement of cash flows to prepare ratios to assess liquidity and solvency

POA15: Financial Statement Analysis

- Conduct, report, and interpret horizontal, vertical, and ratio analyses of financial statements
- Conduct, report, and interpret horizontal, vertical, and ratio analyses of financial statements

POA16: Accounting Information Systems

- Define and describe the components of an accounting information system
- Prepare a subsidiary ledger
- Describe Career Paths Open to Individuals with a Joint Education in Accounting and Information Systems
- Analyze and journalize transactions using special journals
- Describe and explain the purpose of special journals and their importance to stakeholders

POA17: Partnership Accounting

- Describe the advantages and disadvantages of organizing as a partnership
- Describe how a partnership is created, including the associated journal entries
- Compute and allocate partners' share of income and loss
- Prepare journal entries to record the admission and withdrawal of a partner
- Discuss and record entries for the dissolution of a partnership

The Math of Money

TMM01: The Math of Money

- Acquire essential financial terminology and concepts necessary for discussing and analyzing financial matters
- Master the fundamentals of balance sheets and their significance in evaluating financial health and making financial decisions

- Understand the fundamentals of the macroeconomy, including its components and how they impact financial decisions

TMM02: Debt

- Explore the world of credit cards and understand their mechanics, benefits, and potential pitfalls
- Examine different aspects of automobile financing and grasp the key factors to consider when financing a car
- Dive into the complexities of mortgages, including terminology and calculations involved in mortgage loans

TMM03: Investing and Retirement

- Gain insights into the basics of investment, including various investment vehicles and their risk-return profiles
- Explore the world of stocks, bonds, and mutual funds, understanding how they function and their roles in investment portfolios
- Develop a comprehensive understanding of retirement planning, including the importance of saving, investment strategies, and types of retirement accounts

TMM04: Taxes

- Examine non-income taxes, such as property taxes and sales taxes, and understand their impact on personal finances
- Delve into income tax terminology and forms, learning to navigate the complexities of income tax regulations
- Solve income tax problems, applying tax rules to real-life scenarios and understanding the implications of various tax strategies

TMM05: Insurance

- Explore different types of insurance, including health insurance, property insurances, and income insurances, and their roles in managing financial risks
- Master the concepts and terminologies related to insurance policies and coverage, enabling effective decision-making in insurance matters

Pointful Education

Career Exploration in Finance

CEIF 00: Start Here

- Completion

CEIF 01: Why Pursue a Career in Finance?

- Identify the purposes of finance and its impact on society
- Examine the history of Wall Street
- Explain the regulation of the securities and investments industry
- Preview the career paths that will be presented throughout the course (investment banking, sales and trading, private wealth management, and financial planning and analysis)
- Examine Lehman Brothers, including its history, culture, and current situation

CEIF 02: Finance Basics

- Employ numbers and operations in finance
- Describe the nature and scope of accounting
- Explain securities and investments products and their benefits
- Perform calculations and analyses on data using a spreadsheet
- Construct charts/tables/graphs from function and data
- Discuss the importance of written and verbal communication in finance

CEIF 03: Investment Banking

- Define investment banking and key financial terms regarding mergers and acquisitions
- Explain the role of valuation in making appropriate financial decision for a company
- List and evaluate product and industry groups within an investment bank
- Examine the differences between large (bulge bracket) banks and smaller (boutique) banks
- Describe the roles and requirements of an investment banking analyst
- Identify training, education, and certification requirements for investment bankers
- Align safety issues with appropriate safety standards to ensure a safe workplace

CEIF 04: Sales and Trading

- Define sales and trading and key financial terms regarding trading securities
- Examine the differences between equities, fixed income, forex, and derivatives

- Describe the roles and requirements of a sales and trading analyst
- Evaluate the efficient market hypothesis
- Describe algorithmic or high-frequency trading and compare it to human traders
- Discuss legal and ethical considerations in buying and selling securities
- Examine JP Morgan Chase, including its history, culture, and current situation

CEIF 05: Private Wealth Management

- Define private wealth management
- Describe the roles and requirements of a private wealth analyst
- Compare the various platforms that a private wealth analyst could work for
- Describe investment analysis and selection processes
- Explain factors to consider when selecting investments
- Discuss the nature of investment risk
- Discuss the difference between expected returns of bonds and stocks
- Select investments for clients
- Interpret financial ratios significant to investors
- Discuss the rise of robo-advisors and analyze if it is a threat to private wealth management
- Examine Bank of America Merrill Lynch, including its history, culture, and current situation

CEIF 06: Financial Planning and Analysis

- Define financial planning and key terms related to financial statements and financial-information management
- Describe the roles and requirements of a financial analyst as well as other careers in corporate finance
- Explain the nature of capital investment
- Conduct cash flow analysis to select an acceptable capital expenditure
- Explain how capital market securities are used to secure financing for a company
- Understand how debt and equity capital are used to raise funds for business growth
- Explain commerce laws and regulations

CEIF 07: High School, College and Internship Preparation

- Discuss the importance of grades, extracurricular activities, and leadership experiences in building a strong resume and personal portfolio

- Describe the role of internships in preparing for a career in finance and identify concrete steps students can take to prepare for internships in high school and college
- Develop a personal career plan to meet career goals and objectives
- Evaluate and use information resources to accomplish specific occupational tasks
- Operate internet applications to perform workplace tasks
- Examine BlackRock, including its history, culture, and current situation

CEIF 08: Networking, Resumes, Cover Letters and Interviews

- Demonstrate skills related to seeking and applying for employment to find and obtain a desired job
- Describe the key components of a resume and compare key components of finance-focused resumes
- Create a resume and cover letter
- Discuss the function and importance of networking and informational interviews
- Describe best practices for preparing for an executing job interviews for finance positions
- Participate in a mock interview
- Demonstrate appropriate methods for accepting or rejecting employment offers
- Discuss the importance of diversity in financial institutions
- Examine Vanguard, including its history, culture, and current situation

CEIF 09: Succeeding on the Job

- Examine UBS, including its history, culture, and current situation
- Describe the importance of attention to detail and use correct grammar, punctuation, and terminology to write and edit documents
- Describe the nature of the Chartered Financial Analysts (CFA) Institute Code of Ethics and Professional Conduct
- Evaluate key factors of success in finance careers
- Identify traits for retaining employment to maintain employment once secured
- Examine the importance of leadership and teamwork skills to accomplish organizational goals and objectives
- Identify and exhibit traits for retaining employment to maintain employment once secured
- Explain securities and investments licensing and certification programs, including FINRA Series license exams and explain professional designations
- Discuss the pros and cons of the Chartered Financial Analyst program

CEIF 10: Life After Banking

- Examine the potential career paths, after entry-level finance jobs, in private equity
- Examine the potential career paths, after entry-level finance jobs, in hedge funds
- Examine employment opportunities in venture capital and entrepreneurship
- Recognize requirements for career advancement to plan for continuing education and training
- Evaluate graduate school possibilities, including law and MBA programs
- Examine Carlyle, including its history, culture, and current situation
- Demonstrate skills in evaluating and comparing employment opportunities in order to accept employment positions that match career goals

CEIF 11: Course Wrap-up/Final Exam

- Completion

Fundamentals of Bitcoin & Cryptocurrency

FBIT 00: Module 0 - Start Here

- Completion

FBIT 01: What is Bitcoin? - Introduction

- List four definitions of bitcoin and describe what each of them means
- Identify drivers of the value of bitcoin
- Examine the historical price of bitcoin and label drivers of major price movements
- Compare bitcoin with other methods of payment
- Find the current price of bitcoin and convert bitcoins to US dollars and vice versa
- Describe the divisibility of bitcoin and how this enables micropayments
- Recognize the risks of using bitcoin as a currency and as an extremely speculative investment

FBIT 02: Cryptography for Beginners

- Describe encryption, decryption, and ciphers
- Define hash function, algorithm, and one-way function
- Demonstrate how to get a hash function from a text string input
- Describe the 3 main properties of a hash function
- Review exponents and evaluate the importance of mathematics in cryptography
- Discuss shortcomings of previous attempts at creating a digital currency and why they failed

- Describe how bitcoin addresses the double spend problem

FBIT 03: Public and Private Keys

- Describe how a private and public key pair control ownership of bitcoin
- Define a cryptographic public key and cryptographic private key
- Evaluate methods and best practices for securing private keys
- Demonstrate the use of a digital signature
- Define multi-sig and explain how this is used to control bitcoin and other cryptocurrencies
- Identify future career opportunities and pathways in bitcoin

FBIT 04: Nodes, Wallets, and Addresses

- Define a bitcoin node
- Describe the four functions of nodes in the bitcoin network
- Define a bitcoin address and explain the difference between an address and a wallet
- Compare a digital wallet with a physical wallet
- Categorize the five wallet platforms
- Contrast hardware wallets and software wallets
- Demonstrate how to open a bitcoin wallet
- Select a commercial bitcoin wallet provider to evaluate and describe its key characteristics

FBIT 05: Bitcoin Mining

- Define bitcoin mining, proof of work, and other key terms related to mining
- Describe the characteristics of the mathematical puzzle that miners must solve and verify to win a mining round
- Describe the history and development of bitcoin mining, including the increase in hashing power of the system
- Evaluate the characteristics of how to make bitcoin mining profitable
- Examine the incentives of miners and nodes to support the bitcoin network
- Discuss the pros and cons of the high energy usage required in bitcoin mining

FBIT 06: Transacting Bitcoin

- Describe the steps to completing a bitcoin transaction (either receiving money or paying using bitcoin)
- Demonstrate how to transfer, receive, and spend bitcoin
- Identify transaction inputs and transaction outputs

- Explain transaction costs for both buyers and sellers, and compare them across payment methods
- Contrast the irreversibility of bitcoin transactions with other electronic payment networks
- Compare the pros and cons of being a bitcoin merchant
- Describe the Lightning Network and how it is able to reduce transaction costs

FBIT 07: Bitcoin Security

- Compare the security of holding value in bitcoin wallets to holding dollars in a bank or in the stock market
- Evaluate the security of the bitcoin network
- Describe a 51% attack
- Examine the vulnerability of the bitcoin network to quantum computing developments
- Define pseudonymity, anonymity, and privacy in the context of bitcoin transactions
- Identify best practices of securing personal wallets and bitcoin holdings

FBIT 08: Bitcoin and Money

- Describe the three principle characteristics of money
- Define monetary system, inflation, and deflation
- Evaluate give historical examples of hyperinflation
- Examine the historical types of money
- List the properties of a strong currency and evaluate Bitcoin's strength based on these properties
- Discuss the principle of trust associated with various forms of money
- Research a historical monetary unit, describing and evaluating how it was used as currency

FBIT 09: Altcoins and Regulations

- Define altcoin and explain features of bitcoin that can be altered
- Contrast features of bitcoin with other major altcoins such as Litecoin, Dash, and Ripple
- Define cryptocurrency market capitalization, demonstrate how it is calculated, and look up its current value
- Evaluate the altcoin Ethereum, describing its features and smart contracts
- Describe Initial Coin Offering (ICO) and venture capital and compare how they are used to raise money for new projects

- Examine proposed or existing regulations and discuss how government actions may impact bitcoin and altcoins
- Choose an altcoin or token and describe its purpose and features

FBIT 10: Bitcoin : the Past and the Future

- Differentiate between a hard fork and a soft fork
- Evaluate the block size debate and identify how the block size affects transaction fees and costs
- List locations for credible information and updates on bitcoin developments including twitter, reddit, podcasts, and credible news outlets
- Summarize the potential of bitcoin and blockchain technologies to redefine transfer of value and monetary systems
- Choose a recent or current issue in cryptocurrencies and describe and evaluate the arguments made by both sides
- List key issues that affect bitcoin's price and network
- Define a fork and describe the reasons behind past forks in the bitcoin network

FBIT 11: Course Wrap-up/Final Exam

- Completion

Fundamentals of Blockchain and Cryptocurrency

FBC 00: Module 0 - Start Here

- Completion

FBC 01: Intro to blockchain and The Blockchain

- Describe bitcoin, its creation, and how it functions
- Define blockchain and distributed ledger technology
- Differentiate between a private and public blockchain, and permission and non-permissioned blockchains
- Evaluate the principle of trust in society and how blockchain technology enables greater trust
- List possible applications of blockchain technology

FBC 02: Blockchain and Transactions

- Identify career opportunities in blockchain technology at banks and educational paths to enter those careers

- Describe how ledgers record transactions and examine how double-entry book-keeping paved the way for capitalism
- Differentiate between centralized and decentralized ledgers
- Define and give examples of intermediaries in today's economy
- Explain transaction costs for both buyers and sellers
- Describe how blockchain-based transactions can improve trust and reduce costs

FBC 03: Blockchain and Education

- Evaluate the size and scope of the problem of fraudulent and fake degrees
- Compare a blockchain-based credential with a traditional paper-based credential
- Describe companies and projects that are utilizing blockchain-based credentials
- Discuss the benefits and risks of using the blockchain for education credentials
- Examine additional ways that blockchain technology can be used in education beyond credentials

FBC 04: Blockchain and Identity - Introduction

- Describe the problems of current identity management
- List the limitations of biometric identification, paper-based documentation, and physical signatures
- Differentiate between physical and digital identity
- Define self-sovereign identity
- Evaluate projects and companies that are creating blockchain-based solutions that help solve global identity problems
- Discuss the growing field of blockchain jobs and careers in identity management

FBC 05: Blockchain and Smart Contracts

- List the components of a contract and summarize why contracts are used
- Provide examples of traditional contracts
- Describe the problems with traditional contracts, contract law, and enforcement/execution
- Define smart contract
- Evaluate how blockchain technology, including the Ethereum blockchain, can be used to create and execute smart contracts
- List examples of smart contract projects and applications
- Examine the problems and risks with smart contracts (compared to traditional contracts)

FBC 06: Blockchain and Music

- Define the problems with the existing music and record label industry
- Describe how blockchain technology can be used in the music industry
- Outline the benefits for musicians, artists, and fans by using blockchain based systems
- Compare some existing blockchain music project and companies
- Discuss the downsides or problems of using the blockchain for music rather than existing systems

FBC 07: Blockchain and Voting

- Define the problems with the existing paper and electronic voting systems
- Compare and explain blockchain voting projects and companies
- Outline the potential benefits of blockchain technology when applied to elections and voting
- Discuss the downsides or problems of using the blockchain for voting rather than existing systems
- Describe how blockchain technology can be used in securing digital voting records

FBC 08: Blockchain and Healthcare

- Outline the problems with medical records, including data breaches, privacy, and data management
- Identify career opportunities in healthcare and blockchain technology and educational paths to enter those careers
- Describe how blockchain technology can be used in controlling, securing, and monetizing personal healthcare records
- Define the healthcare supply chain for medicine and identify problems with the supply chain
- Evaluate the potential for blockchain to improve the healthcare supply chain

FBC 09: Course Wrap-up/Final Exam

- Completion

Personal Finance

Personal Finance 00: Start Here

- Completion

Personal Finance 01: Money and You: The Role of Individuals and Families in the Global Economy

- Identify the importance of financially self-sufficient families to the stability of the American economic system.
- Identify the role and importance of the consumer in the economic system.
- Define consumer education terminology, including capitalism, resources, economic system, financial literacy, and supply and demand.
- Describe the characteristics of a free enterprise system.
- Summarize the laws of supply and demand and explain their importance in a free enterprise system.

Personal Finance 02: Money Decisions: Personal and Family Financial Choices

- Discuss the importance of taking responsibility for personal financial decisions and explain how personal financial resources affect the choices people make.
- Apply a decision-making process to making consumer choices concerning public transportation and vehicle ownership, including leasing versus owning and new versus used.
- Apply a decision-making process to making consumer choices concerning housing, including renting versus owning.
- Describe how shared decision-making regarding income allocation and expenditures works in a family setting as well as the interrelationship of time, effort, and money to achieving personal and family goals.
- Identify the advantages and disadvantages of dual income families.
- Explain discretionary and disposable income and how it affects personal and family spending.

Personal Finance 03: Money Making: Strategies for Creating and Managing Income

- Identify sources of income and how career choice, education, and technical skills affect income.
- Relate personal income goals and financial goals to life events and explain the effects of income on purchasing power.
- Identify the opportunity cost of various financial decisions, including the costs of time, risk, and resources.
- Compare the advantages and disadvantages of different payment methods (i.e. digital and mobile, credit cards, automatic withdrawals, cash, bitcoin/digital currencies, etc.)
- Compare and contrast the cost of living expenses in various locations.

Personal Finance 04: Money Help: Services, Functions and Products in the Financial Industry

- Investigate money management tools (i.e. financial institutions, qualified financial planners, software, digital apps, etc.).
- Demonstrate knowledge of opening and managing bank accounts (checking and savings).
- Balance a checking account.
- Demonstrate knowledge of opening and managing investment accounts (retirement and discretionary).
- Identify rules and regulations of financial institutions pertaining to the consumer (i.e. FDIC, CFPB Dodd-Frank Act, etc.).

Personal Finance 05: Making Informed Buying Decisions

- Describe the effects of advertising and social media on consumer purchases.
- Investigate and evaluate consumer information regarding products and services (i.e. Consumer Reports, Yelp/Google/Amazon reviews, Better Business Bureau, etc.).
- Identify state and federal agencies that provide consumer protection and the rights and responsibilities of buyers and sellers under consumer protection laws.
- Compare different credit plans such as revolving charge, 90 day, installment accounts, and interest-free.
- Demonstrate advocacy of personal financial relations with businesses (i.e. contest incorrect billing statements, loss of bank cards, etc.).
- Understand the implications of one's financial digital footprint (i.e. identify theft, scams, cyber-security, etc.).

Personal Finance 06: Money to the Government: Personal Taxation

- Explain the basic principles of taxation.
- List types and sources of taxes at the local, state and federal level ((i.e. income, real estate, payroll (both employer and employee), sales, and others)).
- Identify penalties related to non-payment of income tax and explain the difference between gross and net income.
- Identify and complete forms used to file taxes (e.g. 1040A, 1040EZ, 1099, W-2, W-4 and bank statements). Calculate various taxes (i.e. FICA, SS, Medicare, Federal withholding, sales tax, etc.).

Personal Finance 07: Protecting Money: Insurance, Wills, and Contracts

- Investigate money management tools (i.e. financial institutions, qualified financial planners, software, digital apps, etc.).
- Recognize basic types of leases, service warranties and general sales/credit contracts that offer consumer protection.
- Identify reasons for making a will and related documents (i.e. Power of Attorney, Living Will, Health Care Surrogate, etc.) and why they are important in a financial plan.
- Identify strategies to select qualified professionals and companies that provide insurance products, contracts, real estate and wills.
- Research the implications of receiving an inheritance.

Personal Finance 08: Growing Money: Saving and Investing

- Describe reasons and methods for saving (i.e. emergency fund, pay yourself first, big purchases, sinking funds, etc.).
- Describe reason (retirement, savings, security) and methods for investing (i.e. mutual funds, stocks, real estate, precious metals, cryptocurrencies, etc.).
- Describe how to buy and sell investments.
- Explain investor protection provided by agencies that regulate the financial markets (i.e. FDIC, CFPB, SEC).
- Explain how inflation affects different types of investments.
- Identify three global stock or financial exchanges and the types of securities listed on each.
- Compare and contrast robo advisors (Robinhood) with traditional human advisors.

Personal Finance 09: Borrowing Money: Consumer Credit and Loans Part I

- Identify the role consumer credit has in today's economy.
- Compare sources of consumer credit.
- Compare sources and application process of consumer loans (i.e. payday loans, student loans, line-of-credit, and auto loans).
- Analyze the benefits and cost of consumer credit, including student loans.
- Analyze the risks and consequences of consumer credit (i.e., bankruptcy, foreclosure, co-signing, lower credit score and lower credit worthiness).

Personal Finance 10: Money and Risk: Consumer Credit and Loans Part II

- Explain factors that affect credit worthiness and determine one's credit score.

- Explain the alternatives to using consumer credit (i.e., cash, layaway, and planned savings for a large purchase).
- Identify ways to correct credit problems.
- Identify credible sources to assist with credit problems.
- Research credit reporting agencies to check accuracy of one's credit report.
- Compute interest rates by various mechanisms (i.e. simple, compound, APR)

Personal Finance 11: Course Wrap-up/Final Exam

- Completion

Quickbooks

Quickbooks 00: Start Here

- Completion

Quickbooks 01: Setting Up and Managing QuickBooks Online

- Recognize features and benefits of Intuit QuickBooks Online Plus and describe licensing requirements for setting up an entity in Intuit QuickBooks Online
- Describe the process of migrating a company to Intuit QuickBooks Online, the access of each default user role and company, and the company information that you can and can't edit.
- Recognize the benefits of the Close the Books feature as well as compare and contrast the cash and accrual accounting methods
- Identify the purposes of project tracking, class tracking, and locations and how to activate them.
- Identify the tasks performed by automation.

Quickbooks 02: Managing Lists And Recurring Transactions

- Identify the lists that you can import.
- Identify the content of various lists and the appropriate lists for different purposes.
- Identify when and how to add, edit, delete, and merge list items.
- Manage the Chart of Accounts.
- Describe how to implement recurring transactions.
- Describe reasons for making transactions recurring and the types of recurrence.

Quickbooks 03: Managing Journal Entries and Connecting Intuit QuickBooks to Online Apps

- Identify the information required for journal entries
- Describe how to implement journal entries

- Identify the purpose of apps
- Identify where to get apps
- Identify the risks and benefits of extending functionality through apps

Quickbooks 04: Setting Up Customers, Products, and Services

- Identify the importance of the Display Name field, billing addresses, and shipping addresses.
- Define and describe the use of customer payment terms and identify taxable and non-taxable customers.
- Define and describe the correct use of sub-customers
- Describe and differentiate between products and services and identify the information required to set them up.
- Describe reasons for setting-up products or services and contrast inventory products and non-inventory products.

Quickbooks 05: Managing Sales Settings and Recording Money-In Transactions

- Customize sales forms and email message forms
- Describe the purpose of activating customer discounts and the purpose of the payment feature and how it differs from traditional payments
- Describe the money-in transaction workflow
- Record and manage invoices, sales receipts, credit memos, and refund receipts.
- Receive, record, and manage payments, undeposited funds, and deposits.

Quickbooks 06: Managing Vendor Records and Expense Settings

- Describe how to identify existing customers and vendors as well as when and how to merge vendor accounts.
- Describe how to add or change vendor payment terms and how and why to identify vendors as 1099 contractors.
- Describe how and why to activate expense tracking by customer.
- Describe when and how to make expenses and items billable.
- Describe how to identify unbilled billable expenses.

Quickbooks 07: Recording and Managing Basic Money-Out Transactions

- Describe the money-out transaction workflow and types of money-out transactions.
- Compare and describe the appropriate use of checks and bill payments as well as the effects of recording bills, checks, and credit card transactions.
- Differentiate between expense transactions and bank feed transactions

- Describe how to record check, credit card, and debit card expense transactions as well as the use and effects of vendor credits and refunds.
- Describe why and how to void, delete, and edit money-out transactions and the impact thereof.

Quickbooks 08: Bank Accounts, Transaction Rules, and Receipts

- Identify the types of financial accounts Intuit QuickBooks Online can connect to and the benefits of connecting to those accounts.
- Process bank feed transactions and describe the use of bank rules.
- Identify methods for uploading receipts.
- Describe how to record transactions from uploaded receipts.

Quickbooks 09: Basic Reports and Views

- Describe the content and purpose of financial reports, money-in reports, and money-out reports.
- Customize standard reports
- Identify report delivery formats
- Describe the content of the Audit Log
- Describe the content and functionality of the dashboards.
- Prepare for your QuickBooks Online Certification.

Quickbooks 10: Course Wrap-up/Final Exam

- Completion

Government & Public Administration

Open Textbooks

AMERICAN GOVERNMENT (2E 2 SECOND EDITION)

Chapter 1: American Government and Civic Engagement

- Explain the tradeoffs perspective on government
- Explain the importance of citizen engagement in a democracy
- Describe the main ways Americans can influence and become engaged in government
- Discuss factors that may affect people's willingness to become engaged in government
- Explain what government is and what it does

- Identify the type of government in the United States and compare it to other forms of government
- Describe the pluralism-elitism debate

Chapter 10: Interest Groups and Lobbying

- Identify the various court cases, policies, and laws that outline what interest groups can and cannot do
- Evaluate the arguments for and against whether contributions are a form of freedom of speech
- Explain how interest groups differ from political parties
- Evaluate the different types of interests and what they do
- Compare public and private interest groups
- Explain the concept of collective action and its effect on interest group formation
- Describe free riding and the reasons it occurs
- Discuss ways to overcome collective action problems
- Analyze how interest groups provide a means for political participation
- Explain why lower socioeconomic status citizens are not well represented by interest groups
- Identify the barriers to interest group participation in the United States
- Explain how interest groups influence the government through the governance processes
- Describe how interest groups influence the government through elections

Chapter 11: Congress

- Discuss the three kinds of powers granted to Congress
- Explain how fundamental characteristics of the House and Senate shape their elections
- Discuss campaign funding and the effects of incumbency in the House and Senate
- Analyze the way congressional elections can sometimes become nationalized
- Explain the basics of representation
- Describe the extent to which Congress as a body represents the U.S. population
- Explain the concept of collective representation
- Describe the forces that influence congressional approval ratings
- Explain the division of labor in the House and in the Senate
- Describe the way congressional committees develop and advance legislation
- Explain the steps in the classic bill-becomes-law diagram

- Describe the modern legislative processes that alter the classic process in some way
- Define bicameralism
- Describe the role of Congress in the U.S. constitutional system
- Explain gerrymandering and the apportionment of seats in the House of Representatives

Chapter 12: The Presidency

- Explain the reason for the design of the executive branch and its plausible alternatives
- Analyze the way presidents have expanded presidential power and why
- Identify the limitations on a president's power
- Describe changes over time in the way the president and vice president are selected
- Identify the stages in the modern presidential selection process
- Assess the advantages and disadvantages of the Electoral College
- Explain how incoming and outgoing presidents peacefully transfer power
- Describe how new presidents fill positions in the executive branch
- Discuss how incoming presidents use their early popularity to advance larger policy solutions
- Explain how technological innovations have empowered presidents
- Identify ways in which presidents appeal to the public for approval
- Explain how the role of first ladies changed over the course of the twentieth century
- Identify the power presidents have to effect change without congressional cooperation
- Analyze how different circumstances influence the way presidents use unilateral authority
- Explain how presidents persuade others in the political system to support their initiatives
- Describe how historians and political scientists evaluate the effectiveness of a presidency

Chapter 13: The Courts

- Describe the evolving role of the courts since the ratification of the Constitution
- Explain why courts are uniquely situated to protect individual rights
- Recognize how the courts make public policy
- Describe the dual court system and its three tiers
- Explain how you are protected and governed by different U.S. court systems
- Compare the positive and negative aspects of a dual court system

- Describe the differences between the U.S. district courts, circuit courts, and the Supreme Court
- Explain the significance of precedent in the courts' operations
- Describe how judges are selected for their positions
- Analyze the structure and important features of the Supreme Court
- Describe how the Supreme Court decides cases and issues opinions
- Identify the various influences on the Supreme Court
- Explain how the judiciary is checked by the other branches of government
- Explain how the Supreme Court selects cases to hear
- Discuss the Supreme Court's processes and procedures

Chapter 14: State and Local Government

- Explain how the balance of power between national and state governments shifted with the drafting and ratification of the Constitution
- Identify parts of the Constitution that grant power to the national government and parts that support states' rights
- Identify two fiscal policies by which the federal government exerts control over state policy decisions
- Compare Daniel Elazar's three forms of political culture
- Describe how cultural differences between the states can shape attitudes about the role of government and citizen participation
- Discuss the main criticisms of Daniel Elazar's theory
- Identify the formal powers and responsibilities of modern-day governors
- List the basic functions performed by state legislatures
- Describe how state legislatures vary in size, diversity, party composition, and professionalism
- Identify the differences between county and municipal governments in terms of their responsibilities and funding sources
- Describe the two primary types of municipal government and the three basic types of county government

Chapter 15: The Bureaucracy

- Define bureaucracy and bureaucrat
- Describe the evolution and growth of public administration in the United States
- Identify the reasons people undertake civil service

- Explain how the creation of the Civil Service Commission transformed the spoils system of the nineteenth century into a merit-based system of civil service
- Understand how carefully regulated hiring and pay practices helps to maintain a merit-based civil service
- Explain the three different models sociologists and others use to understand bureaucracies
- Identify the different types of federal bureaucracies and their functional differences
- Explain the way Congress, the president, bureaucrats, and citizens provide meaningful oversight over the bureaucracies
- Identify the ways in which privatization has made bureaucracies both more and less efficient

Chapter 16: Domestic Policy

- Describe the public policy process
- Discuss economic theories that shape U.S. economic policy
- Explain how the government uses fiscal policy tools to maintain a healthy economy
- Analyze the taxing and spending decisions made by Congress and the president
- Discuss the role of the Federal Reserve Board in monetary policy
- Explain the concept of public policy
- Discuss examples of public policy in action
- Describe the different types of goods in a society
- Identify key public policy domains in the United States
- Compare the different forms of policy and the way they transfer goods within a society
- Identify the key domestic arenas of public policy
- Describe the major social safety net programs
- List the key agencies responsible for promoting and regulating U.S. business and industry
- Identify types of policymakers in different issue areas

Chapter 17: Foreign Policy

- Explain what foreign policy is and how it differs from domestic policy
- Identify the objectives of U.S. foreign policy
- Describe the different types of foreign policy
- Identify the U.S. government's main challenges in the foreign policy realm
- Describe the outputs of broadly focused U.S. foreign policy
- Describe the outputs of sharply focused U.S. foreign policy

- Analyze the role of Congress in foreign policy
- Describe the use of shared power in U.S. foreign policymaking
- Explain why presidents lead more in foreign policy than in domestic policy
- Discuss why individual House and Senate members rarely venture into foreign policy
- List the actors who engage in foreign policy
- Explain classic schools of thought on U.S. foreign policy
- Describe contemporary schools of thought on U.S. foreign policy
- Delineate the U.S. foreign policy approach with Russia and China

Chapter 2: The Constitution and Its Origins

- Identify the origins of the core values in American political thought, including ideas regarding representational government
- Summarize Great Britain's actions leading to the American Revolution
- Describe the steps taken during and after the American Revolution to create a government
- Identify the main features of the Articles of Confederation
- Describe the crises resulting from key features of the Articles of Confederation
- Identify the conflicts present and the compromises reached in drafting the Constitution
- Summarize the core features of the structure of U.S. government under the Constitution
- Identify the steps required to ratify the Constitution
- Describe arguments the framers raised in support of a strong national government and counterpoints raised by the Anti-Federalists
- Describe how the Constitution can be formally amended
- Explain the contents and significance of the Bill of Rights
- Discuss the importance of the Thirteenth, Fourteenth, Fifteenth, and Nineteenth Amendments

Chapter 3: American Federalism

- Explain how federal intergovernmental grants have evolved over time
- Identify the types of federal intergovernmental grants
- Describe the characteristics of federal unfunded mandates
- Explain the dynamic of competitive federalism
- Analyze some issues over which the states and federal government have contended
- Discuss the advantages of federalism
- Explain the disadvantages of federalism
- Explain the concept of federalism

- Discuss the constitutional logic of federalism
- Identify the powers and responsibilities of federal, state, and local governments
- Describe how federalism has evolved in the United States
- Compare different conceptions of federalism

Chapter 4: Civil Liberties

- Identify the key positions on civil liberties taken at the Constitutional Convention
- Identify the liberties and rights guaranteed by the first four amendments to the Constitution
- Explain why in practice these rights and liberties are limited
- Explain why interpreting some amendments has been controversial
- Identify the rights of those suspected or accused of criminal activity
- Explain how Supreme Court decisions transformed the rights of the accused
- Explain why the Eighth Amendment is controversial regarding capital punishment
- Describe how the Ninth and Tenth Amendments reflect on our other rights
- Identify the two senses of "right to privacy" embodied in the Constitution
- Explain the controversy over privacy when applied to abortion and same-sex relationships
- Explain the Civil War origin of concern that the states should respect civil liberties
- Define civil liberties and civil rights
- Describe the origin of civil liberties in the U.S. context

Chapter 5: Civil Rights

- Explain how the courts, Congress, and the executive branch supported the civil rights movement
- Define the concept of civil rights
- Describe the standards that courts use when deciding whether a discriminatory law or regulation is unconstitutional
- Identify three core questions for recognizing a civil rights problem
- Identify key events in the history of African American civil rights
- Describe the role of grassroots efforts in the civil rights movement
- Describe early efforts to achieve rights for women
- Explain why the Equal Rights Amendment failed to be ratified
- Describe the ways in which women acquired greater rights in the twentieth century
- Analyze why women continue to experience unequal treatment
- Outline the history of discrimination against Native Americans

- Describe the expansion of Native American civil rights from 1960 to 1990
- Discuss the persistence of problems Native Americans face today
- Discuss the discrimination faced by Hispanic/Latino Americans and Asian Americans
- Describe the influence of the African American civil rights movement on Hispanic/Latino, Asian American, and LGBT civil rights movements
- Describe federal actions to improve opportunities for people with disabilities
- Describe discrimination faced by religious minorities

Chapter 6: The Politics of Public Opinion

- Identify factors that change public opinion
- Analyze polls to determine whether they accurately measure a population's opinions
- Explain why Americans hold a variety of views about politics, policy issues, and political institutions
- Compare levels of public support for the branches of government
- Explain the circumstances that lead to public opinion affecting policy
- Compare the effects of public opinion on government branches and figures
- Identify situations that cause conflicts in public opinion
- Explain how information about public opinion is gathered
- Identify common ways to measure and quantify public opinion
- Define public opinion and political socialization
- Explain the process and role of political socialization in the U.S. political system
- Compare the ways in which citizens learn political information
- Explain how beliefs and ideology affect the formation of public opinion

Chapter 7: Voting and Elections

- Identify the different forms of and reasons for direct democracy
- Summarize the steps needed to place initiatives on a ballot
- Explain why some policies are made by elected representatives and others by voters
- Analyze ways states increase voter registration and decrease fraud
- Summarize similarities and differences in states' voter registration methods
- Identify ways the U.S. government has promoted voter rights and registration
- Identify factors that motivate registered voters to vote
- Discuss circumstances that prevent citizens from voting
- Analyze reasons for low voter turnout in the United States
- Describe the stages in the election process

- Compare the primary and caucus systems
- Summarize how primary election returns lead to the nomination of the party candidates
- Compare campaign methods for elections
- Identify strategies campaign managers use to reach voters
- Analyze the factors that typically affect a voter's decision

Chapter 8: The Media

- Explain what the media are and how they are organized
- Describe the main functions of the media in a free society
- Compare different media formats and their respective audiences
- Discuss the history of major media formats
- Compare important changes in media types over time
- Explain how citizens learn political information from the media
- Identify circumstances in which the freedom of the press is not absolute
- Compare the ways in which the government oversees and influences media programming
- Identify forms of bias that exist in news coverage and ways the media can present biased coverage
- Explain how the media cover politics and issues
- Evaluate the impact of the media on politics and policymaking

Chapter 9: Political Parties

- Describe political parties and what they do
- Differentiate political parties from interest groups
- Explain how U.S. political parties formed
- Describe the effects of winner-take-all elections
- Compare plurality and proportional representation
- Describe the institutional, legal, and social forces that limit the number of parties
- Discuss the concepts of party alignment and realignment
- Differentiate between the party in the electorate and the party organization
- Discuss the importance of voting in a political party organization
- Compare the perspectives of the party in government and the party in the electorate
- Discuss the problems and benefits of divided government
- Define party polarization
- List the main explanations for partisan polarization

- Explain the implications of partisan polarization
- Describe party organization at the county, state, and national levels

Health Science

ATSVR

ATSVR

VR-01 New User Tutorial

- Learn how to walk in a VR headset
- Learn how to select objects in a VR headset
- Learn how to grab objects in a VR headset
- Learn how to look around in a VR headset

VR-02 Triage Tutorial

- Learn to administer START Triage in a hospital
- Learn how to recognize and tag Minor (green) victims
- Learn how to recognize and tag Delayed (yellow) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Deceased (black) victims
- Learn when and how to use an oral or nasal airway
- Learn when and how to use a tourniquet
- Learn when and how to use a chest seal

VR-03 Active Shooter Mass Casualty Event: Hospital Emergency Preparedness - Beginner

- Learn how to recognize and tag Minimal (green) victims
- Learn to administer SALT Triage in a hospital
- Learn how to recognize and tag Delayed (yellow) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Expectant (grey) victims
- Learn how to recognize and tag Deceased (black) victims
- Learn when and how to treat an obstructed neck
- Learn when and how to use a tourniquet
- Learn when and how to use a chest seal
- Learn when and how to use a decompression needle

- Learn how to use a Bag Valve Mask

VR-04 Active Shooter Mass Casualty Event: Hospital Emergency Preparedness - Intermediate

- Learn how to use a Bag Valve Mask
- Learn when and how to use a decompression needle
- Learn when and how to use a chest seal
- Learn when and how to use a tourniquet
- Learn when and how to treat an obstructed neck
- Learn how to recognize and tag Deceased (black) victims
- Learn how to recognize and tag Expectant (grey) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Delayed (yellow) victims
- Learn to administer SALT Triage in a hospital
- Learn how to recognize and tag Minimal (green) victims

VR-05 Active Shooter Mass Casualty Event: Hospital Emergency Preparedness - Advance

- Learn how to recognize and tag Minimal (green) victims
- Learn to administer SALT Triage in a hospital
- Learn how to recognize and tag Delayed (yellow) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Expectant (grey) victims
- Learn how to recognize and tag Deceased (black) victims
- Learn when and how to treat an obstructed neck
- Learn when and how to use a tourniquet
- Learn when and how to use a chest seal
- Learn when and how to use a decompression needle
- Learn how to use a Bag Valve Mask

VR-06 Mass Casualty Event Reunification Protocol - Beginner

- Learn how to effectively calm panicked children down
- Learn how to manage unaccompanied children after a mass casualty incident
- Learn how to calm children with special needs down
- Learn how to collect information on unaccompanied children
- Learn how to measure a child's weight
- Learn how to measure a child's height

- Learn how to use a brazlo tape
- Learn how to take pictures of children

VR-07 Mass Casualty Event Reunification Protocol - Intermediate

- Learn how to take pictures of children
- Learn how to use a brazlo tape
- Learn how to measure a child's height
- Learn how to measure a child's weight
- Learn how to collect information on unaccompanied children
- Learn how to calm children with special needs down
- Learn how to manage unaccompanied children after a mass casualty incident
- Learn how to effectively calm panicked children down

VR-08 Mass Casualty Event Reunification Protocol - Advance

- Learn how to effectively calm panicked children down
- Learn how to manage unaccompanied children after a mass casualty incident
- Learn how to calm children with special needs down
- Learn how to collect information on unaccompanied children
- Learn how to measure a child's weight
- Learn how to measure a child's height
- Learn how to use a brazlo tape
- Learn how to take pictures of children

VR-09 Vehicle and Machine Training - Explore

- Learn how to enter an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate patent carrying medical equipment within an emergency medical vehicle
- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle

- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle
- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle

VR-10 Vehicle and Machine Training - Beginner

- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle
- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle
- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle
- Learn how to identify and locate patent carrying medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to enter an emergency medical vehicle

VR-11 Vehicle and Machine Training - Intermediate

- Learn how to enter an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate patent carrying medical equipment within an emergency medical vehicle
- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle
- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle

- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle

VR-12 Vehicle and Machine Training - Advance

- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle
- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle
- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle
- Learn how to identify and locate patent carrying medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to enter an emergency medical vehicle

Certify ED

Biotechnology (Video & VR)

Biotechnology - Unit 01 - Biotechnology: A Scientific and Legal Perspective

- Describe the variety of career paths in science that exist in biotechnology.
- Describe the variety of career paths in the field of biotechnology that are not science related.
- Understand the significance of science in biotechnology.
- Discuss the historical context in which the field of biotechnology emerged by identifying key scientific developments.
- Explain the role of patents and licensing processes in new biotechnology innovations.
- Demonstrate an ability to maintain records in accordance with Intellectual Property Law.

Biotechnology - Unit 02 - Biotechnology Research and Development: A Global Perspective

- Describe the unique qualities of a biotechnology research laboratory.

- Discuss the importance of quality research programs and techniques in biotechnology.
- Describe experimental design and its role in the biotechnology research laboratory.
- Compare and contrast a research laboratory with a production industrial laboratory for biomanufacturing.
- Discuss the regulations involved with manufacturing a biological product and the role of contract manufacturing organizations (CMOs).
- Explain the global nature of professionalism.
- Demonstrate the ability to organize, implement, and troubleshoot specific tasks.
- Discuss the importance of working in teams and respecting differences between different people and cultures.

Biotechnology - Unit 03 - Scientific Method: Experimental Design, Data Analysis, and Hypothesis Testing

- Describe experimental design and proper data analysis.
- Discuss commonly used statistical terms in data analysis.
- Describe the nature of scientific inquiry.
- Distinguish between observations and inferences.
- Outline the generalized steps of performing hypothesis-based science.

Biotechnology - Unit 04 - Fundamentals of Laboratory Techniques: The Scientific Method, Buffers, Measurements, and Solutions

- Demonstrate the ability to use the scientific method.
- Define buffer and discuss how buffers are used in biotechnology.
- Describe the SI system and identify the base units and prefixes used for measurement.
- Describe how dilutions are created from solutions.
- Properly prepare buffers and solutions.

Biotechnology - Unit 05 - Recombinant DNA Technology: Principles and Applications

- Define and explain recombinant DNA.
- Discuss recombinant proteins.
- Demonstrate the concepts of recombinant technology.
- Describe the chemical structure of DNA and how it is organized in a cell.
- Explain the process of DNA replication.
- Describe the DNA purification process.
- Discuss various methods that are used to analyze DNA.
- Explain what role DNA plays in biotechnology.

- Demonstrate the principles of DNA isolation.

Biotechnology - Unit 06 - Molecular Biology Techniques: PCR, Electrophoresis, and Aseptic Techniques

- Describe the process of PCR, including denaturation, annealing, and elongation.
- List the components of a PCR reaction.
- Perform Polymerase Chain Reaction (PCR).
- Perform electrophoresis.
- Identify various DNA separation techniques.
- Explain the aseptic techniques that are used to create a sterile environment.
- Explain the uses of a microbial culture.

Biotechnology - Unit 07 - Mammalian Cell Biology and Laboratory Techniques

- Describe a mammalian cell.
- Explain how mammalian cell cultures are obtained.
- Describe laboratory automation.
- Identify the principles of spectrophotometry in a laboratory.
- Define and explain bioethics.
- Demonstrate knowledge of professional ethics.

Biotechnology - Unit 08 - Laboratory Safety in Biotechnology: A Comprehensive Guide

- Describe why safety precautions are important for working in a biotechnology laboratory.
- List and discuss several important safety measures, such as personal protective devices, that are used in the biotechnology laboratory.
- List and describe the hazard levels in the laboratory and the handling of hazardous chemicals.
- Demonstrate use of laboratory hoods for safety and protection.
- Discuss monitoring of safety regulations by internal or external organizations and why it is important.
- Demonstrate knowledge of safety regulatory agencies, such as OSHA.

Biotechnology - Unit 09 - Laboratory Techniques and Equipment Pt. 1

- Document lab activities and findings according to guidelines.
- Demonstrate competency in validating and using laboratory equipment.
- Demonstrate the proper use of laboratory glassware.
- Demonstrate the proper use of volumetric equipment.

- Demonstrate the proper use of balances.
- Demonstrate the proper use of electrophoresis equipment.

Biotechnology - Unit 10 - Laboratory Techniques and Equipment Pt. 2

- Demonstrate the proper use of a spectrophotometer.
- Demonstrate the proper use of pH meters.
- Demonstrate knowledge of thermocyclers.
- Demonstrate the proper use of temperature regulating devices such as water baths and incubators.
- Identify and differentiate the different types of microscopes.
- Demonstrate the proper use of microscopes.
- Demonstrate knowledge of chromatographic equipment.
- Demonstrate knowledge of autoclaves.
- Demonstrate the proper use of centrifuges.

Biotechnology - Unit Sim

- Understand Colony Isolation & Streaking Bacteria
- Understand Micropipettes
- Understand Serological Pipettes
- Understand Making a Molar Solution
- Understand Spectrophotometry

Medical Assistant

Medical Assistant - Unit 01 - Medical Office Communication and Administration

- Identify types of verbal and non-verbal communication used to greet, receive, and direct patients and visitors.
- Define, pronounce and spell common medical terms and abbreviations necessary to safely carry out medical instructions.
- Prepare and manage patient medical records, such as obtaining and recording patient's demographic data insurance information.
- Identify various types of health insurance, including the Affordable Care Act, Medicaid, Medicare, and private insurance.
- Schedule and maintain patient appointment logs, including no-shows, call-backs, reschedules, and cancellations.
- Explain billing practices, such as insurance forms, terminology, procedure, and diagnosis coding.

Medical Assistant - Unit 02 - Measuring Patient Health: Height, Weight, and Vital Signs

- Identify basic medical instruments and equipment.
- Demonstrate activation of the Emergency Medical System (EMS).
- Measure and record height and weight using a variety of measurement systems used in health care.
- Perform basic addition, subtraction, multiplication, and division used in healthcare.
- Convert common weights, measures and volumes to metric.
- Identify body parts and demonstrate knowledge of the function of the basic body parts.
- Identify the relationship between anatomy, physiology, and pathology.
- Identify the basic components of the health care delivery system.

Medical Assistant - Unit 03 - Diagnostic Imaging and Procedures

- Differentiate between the various computer-based diagnostic studies in healthcare, such as X-Ray, MRI, CTScan, and CPET.
- Explain the procedure to the patient, check for contraindications, locate and count the radial pulse, place the cuff and stethoscope at the correct location, and take blood pressure.
- Demonstrate proper EKG procedures and other cardiovascular testing.
- Demonstrate proficiency with laboratory procedures, collecting and preparing specimens, and point-of-care testing such as urinalysis, blood tests, and cultures.
- Explain biomedical equipment usage and maintenance.
- Explain and demonstrate hematology procedures.
- Explain pulmonary function testing procedures.

Medical Assistant - Unit 04 - Vital Signs and First Aid Procedures

- Describe types of wounds and the appropriate first aid treatment.
- Perform aseptic techniques, such as sterilization, sanitation, and disinfection, including how to set up and maintain a sterile field.
- Perform dressing changes and related first aid.
- Demonstrate immobilization for suspected fractures, and cast care if fractured.
- Demonstrate how to conduct a vision screening exam.
- Demonstrate how to conduct a hearing test using simple tools.
- Demonstrate how to test the reflexes.

Medical Assistant - Unit 05 - Emergency Care and Patient Preparation

- Identify various documentation formats including paperless charting.

- Determine the priority of care in an emergency situation.
- Prepare examination room and organize equipment for patient procedures.
- Position and drape patient for examination and/or treatment.
- Assist with patient examinations, transfers, treatments, and minor surgeries.
- Take vital signs, patient's height and weight, record data and report abnormalities.

Medical Assistant - Unit 06 - Pharmacology and Medical Procedures

- Describe first aid for foreign objects in the eye and ear and perform irrigation and/or lavage.
- Perform suture and staple removal.
- Identify commonly administered drugs, their uses and effects.
- Monitor supply of controlled substances.
- Explain intradermal testing, such as Mantoux and allergy tests.
- Calculate medication dosages and administration routes.
- Identify various drugs, drug classifications, and clinical indications.

Medical Assistant - Unit 07 - Emergency Care and Procedures

- Identify classifications of burns and their appropriate treatment.
- Explain the use of and procedures for nebulizer treatments.
- Perform basic first aid and identify CPR/AED basic principles
- Explain the use of pressure points to control bleeding.
- Describe first aid for choking.
- Describe urinary catheterization procedures

Medical Assistant - Unit 08 - Patient Care: Nutrition, Wellness, and Specialized Populations

- Describe basic nutrition principles, therapeutic diets, and health and wellness practices
- Explain the importance of cultural diversity awareness and holistic modalities.
- Identify the stages of growth and development.
- Demonstrate knowledge of assistive devices.
- Communicate discharge instructions.
- Identify a subjective and objective assessment and plan for each patient.
- Identify special considerations for pediatric, disability, disease progression, geriatric patients

Medical Assistant - Unit 09 - Infection Control and Safety Protocols in Medical Assisting

- Perform proper handwashing technique.
- Demonstrate proper application and disposal of Personal Protective Equipment, such as gloves, gown, mask, and goggles.
- Demonstrate the use of basic body mechanics technique.
- Demonstrate how to prevent accidents, injuries and infection in accordance with OSHA standards.
- Apply infection control techniques designed to prevent the spread of diseases to the care of all patients following Centers for Disease Control (CDC) guidelines.
- Demonstrate knowledge of safety data sheets (SDS).
- Demonstrate knowledge of handling and disposal of contaminated materials or spills.
- Recognize types of poisoning and treatment.

Medical Assistant - Unit 10 - Bloodborne Pathogens, Patient Rights, and Legal Considerations

- Distinguish between fact and fallacy about the transmission and treatment of diseases caused by blood borne pathogens.
- Identify community resources and services available to the individual with diseases caused by blood borne pathogens.
- Identify at risk behaviors which promote the spread of HIV/AIDS and the public education necessary to combat the spread of diseases caused by blood borne pathogens.
- Discuss how HIPPA regulations affect the privacy of electronic health records.
- Identify and apply principles related to patient rights, HIPAA, confidentiality, privacy, security, and protected health information regulations, including both electronic and written.
- Explain how the "Good Samaritan" Law protects the first responder in emergency situations.
- Identify members of an interdisciplinary healthcare team and know scope of practice for each.
- Identify and adhere to legal documents, standards, statutes, and regulations, including advance directives, DNR, and healthcare proxy.
- Identify and adhere to work ethics and professional standards.
- Explain the five rights of medication safety.

Medical Assistant - Unit Sim

- Discover the blood pressure of a patient
- Measure a heart rhythm using an ECG machine
- Perform a visual test on a patient
- Properly fill out a patient lab form
- Apply and remove personal protective equipment

Nursing Assistant (Video & VR)

Nursing Assistant - Unit 01 - Nursing Assistant Professional Roles and Responsibilities

- Identify appropriate scope of practice for nursing assistants.
- Identify workplace skills required for nursing assistants in the healthcare industry.
- Identify appropriate health maintenance practices for nursing assistants.
- Utilize verbal and written information to assist with the patient's plan of care.
- Modify communication techniques for patients with special needs, and language barriers.
- Identify medical terms and abbreviations consistent with the nursing field.

Nursing Assistant - Unit 02 - Patient Safety and Infection Control

- Document, report, and maintain accurate patient information.
- Demonstrate the understanding of vulnerable population abuse and reporting procedures per agency.
- Demonstrate knowledge of basic principles of infection control, including standard and transmission-based precautions and PPE.
- Properly identify, handle, and dispose of hazardous and infectious material.
- Identify and respond appropriately to existing and potential hazards including fires, electrical safety, and falls.
- Demonstrate proper hand hygiene techniques.
- Differentiate between medical asepsis and surgical asepsis for sterilization.

Nursing Assistant - Unit 03 - Vital Signs, Patient Transfers, and Basic Body Structure

- Demonstrate ability to accurately measure, record and report vital signs.
- Assist with the admission of a patient or resident.
- Assist with transfer of patient.
- Assist with discharge of patient.
- Recognize basic body structure and identify function including limited diseases, signs, symptoms, and conditions when assisting a patient.

Nursing Assistant - Unit 04 - Vital Signs and Patient Preparation

- Measure and record patient's height, weight, and BMI.
- Assist with basic emergency and first-aid procedures.
- Identify and prepare patient and supplies for medical procedures and tests.
- Provide instructions for and assist in collection of patient specimens.
- Assist patient in passive range-of-motion exercises.

Nursing Assistant - Unit 05 - Personal Care and Hygiene: Bathing, Grooming, and Bed Making

- Give bed bath; observe and report changes in patient including skin and level of consciousness.
- Assist with shower or tub bath, including the use of specialty tubs.
- Groom patient, including hair, skin, foot, hand, and nail care.
- Assist with and administer oral hygiene including denture care.
- Assist patient to dress.
- Make unoccupied or occupied bed.

Nursing Assistant - Unit 06 - Nutrition and Hydration in Nursing Care

- Assist patient with meals.
- Identify nutrients and food groups.
- Prepare a basic food plan.
- Check patient's diet tray for accuracy.
- Identify methods of maintaining fluid balance including forcing and restricting fluids.
- Demonstrate awareness of pain management including comfort measures.

Nursing Assistant - Unit 07 - Patient Comfort and Well-being: Toileting, Mental Health, and Special Needs Care

- Identify appropriate nursing assistant response to inappropriate behavior from patients.
- Provide care for patients with special needs, such as impaired hearing, impaired vision, immobility, impaired body functions, cognitively impaired, and dementia.
- Assist patient with toileting and elimination needs.
- Recognize and report changes in altered patient mental status.
- Identify common alterations in elderly patient behavior.

Nursing Assistant - Unit 08 - Behavioral Management and End-of-Life Care in Nursing Assistance

- Create and follow established Plan of Care (POC) for behavior management.
- Recognize and respond appropriately to symptoms of common diseases, including dementia, depression, suicide, and Alzheimer's.
- Demonstrate awareness of common behaviors in drug use and abuse in the elderly.
- Demonstrate an understanding of end of life care, hospice, and palliative care.

Nursing Assistant - Unit 09 - Mobility and Transfer Techniques

- Assist patient in ambulation, including the use of crutch, cane, or walker.
- Assist patient to dangle.
- Assist patient in using wheelchair.
- Assist patient with care and use of prosthetic and orthotic devices.
- Assist and perform patient transfer using mechanical lifts.
- Demonstrate the proper use of a gait belt in both transfer and ambulation.
- Transfer patient to stretcher.
- Apply comfort devices as directed, including foot-boards, overbed cradles, and alternating pressure mattresses.
- Assist with patient oxygen needs.

Nursing Assistant - Unit 10 - Legal and Ethical Considerations in Nursing Assistance

- Demonstrate understanding of HIPAA regulations regarding privacy and confidentiality.
- Demonstrate legal and ethical behavior within the role and scope of nursing assistant responsibilities.
- Describe the purpose of the chain of communication in resolving patient or employee problems.
- Recognize legal issues involving physical and chemical restraints including alternative solutions.
- Demonstrate awareness of Patient Bill of Rights.
- Demonstrate proper security and care for personal possessions of patients.
- Identify OBRA requirements for maintaining nursing assisting certification.

Nursing Assistant - Unit Sim

- Demonstrate wheelchair assistance
- Perform a modified bed bath
- Identify basic body parts

- Apply and remove personal protective equipment
- Obtain and record standard vital signs

Medcerts

Clinical Medical Assistant & Scribe Professional - HI 9800

Clinical Medical Assistant (v23.3) HI6010

- Display the ability to adhere to infection control and environmental safety protocols
- Understand responsibilities of teamwork and communication skills in healthcare
- Gain understanding and the ability to perform vital signs and anthropometrics
- Discuss the responsibilities of the medical assistant in general, specialty, and surgical practices
- Explain emergency preparedness, pharmacology, and medication administration
- Demonstrate the role of the medical assistant in patient care, specimen collection, and testing

Medical Scribe Essentials (v21.12) HI6015

- Discuss the role, responsibilities, and certification of a Medical Scribe
- Comply with relevant laws and ethics, the Omnibus Rule, HIPAA, and HITECH
- Gain an understanding of the clinic workflow and components of documentation
- Demonstrate knowledge of laboratory testing and pharmacology
- Explain how medical coding plays a role and impacts the clinic workflow
- Display strong attention to detail with the use of the electronic health record

Dental Assistant - DA 3000

Radiation Health and Safety in Dentistry (v24.3) DA3014

- Explain patient preparation and patient management
- Classify and describe radiographic equipment and imagery techniques
- Demonstrate basic knowledge of digital and conventional radiology
- Evaluate and mount radiographic images
- Apply quality assurance and recognize radiology regulations
- Identify American Dental Association radiography guidelines
- Apply operator and patient radiation safety principles and address patient safety concerns
- Explain infection control in radiographic practices

Dental Anatomy, Morphology, and Physiology (v24.3) DA3012

- Examine hard and soft tissues
- Review the circulatory and lymphatic systems
- Identify important head, neck, and oral landmarks
- Discover muscular, skeletal, and nervous systems
- Explore oral cavity anatomy
- Discuss salivary glands
- Review sinuses in head anatomy
- Categorize dental occlusion
- Identify permanent and primary tooth anatomy and morphology
- Explain tooth numbering systems

Dental Assisting Essentials (v24.3) DA3013

- Discover history of dentistry and the dental team
- Gain basic understanding of dental ethics and law
- Gather fundamental dental assisting skills
- Identify clinical tools and techniques
- Review basic dental materials
- Summarize dental specialties
- Discuss patient education
- Describe the dental assistant's role in medical emergencies
- List common prescription drugs
- Recognize the vital role of soft skills

Infection Control in Dental Healthcare Settings (v24.3) DA3011

- Classify infectious diseases and define relationships
- Recognize the importance of medical history documentation and review
- Demonstrate proper hand hygiene throughout all stages and treatment
- Describe the use of personal protective equipment (PPE)
- Summarize dental instrument and device processing
- Discuss infection control and safety programs, policies, and documentation
- Identify dental advisory, regulatory, and professional organizations
- Identify advisory, regulatory, and professional organizations as related to dentistry
- Identify occupational safety standards and workplace controls
- Explain maintenance of aseptic conditions and prevention of cross contamination

Introduction to Human Anatomy & Medical Terminology (v22.10) HI1014

Introduction to Human Anatomy & Medical Terminology (v22.10) HI1014

- Prepare to demonstrate medical language knowledge within the healthcare setting
- Analyze and understand medical terminology
- Recognize the structure and function of human body systems and organs
- Gain an understanding of the medical language related to body systems
- Discuss major diseases and related symptoms

Medical Assistant HI 6000

Clinical Medical Assistant (v23.3) HI6010

- Demonstrate the role of the medical assistant in patient care, specimen collection, and testing
- Discuss the responsibilities of the medical assistant in general, specialty, and surgical practices
- Gain understanding and the ability to perform vital signs and anthropometrics
- Understand responsibilities of teamwork and communication skills in healthcare
- Display the ability to adhere to infection control and environmental safety protocols
- Explain emergency preparedness, pharmacology, and medication administration

Medical Coder & Biller Certification Course

Electronic Health Records (v20.6) HI1018

- Accumulate transferrable skills as applicable to the use and function of electronic health record and practice management applications
- Maintain confidentiality and adhere to HIPAA and HITECH privacy and security requirements throughout the workflow
- Implement accuracy and completeness of documentation to positively affect patient safety and the revenue cycle
- Recognize diagnosis and procedure codes used in the medical record and their contribution to reimbursement
- Generate statistical, financial, and census reports

Insurance and Billing, and Coding Essentials (v24.7) HI1015

- Discuss capture of information and complete CMS-1500 or HIPAA 837P claims
- Apply ICD-10-CM, CPT, and HCPCS codes and modifiers based on coding guidelines

- Describe the phases of the revenue cycle and gain an understanding of basic insurance technology
- Demonstrate knowledge of confidentiality and billing laws, regulations, and standards
- Explain verification of patient financial responsibility and insurance information
- Differentiate government and commercial insurance plans and determine which is primary

Introduction to Human Anatomy & Medical Terminology (v22.10) HI1014

- Discuss major diseases and related symptoms
- Gain an understanding of the medical language related to body systems
- Recognize the structure and function of human body systems and organs
- Analyze and understand medical terminology
- Prepare to demonstrate medical language knowledge within the healthcare setting

Medical Office Procedures & Administration (v23.3) HI1011

- Discuss the role and responsibilities related to medical front office procedures
- Recognize the importance of HIPAA and HITECH compliance laws
- Describe the use and function of practice management and electronic health record software
- Gain understanding of the importance of patient education
- Demonstrate knowledge of patient scheduling
- Explain the various aspects of insurance and reimbursement

Pharmacy Technician Principles & Practices (v23.1) HI1017

- Know current pharmacy laws and medication regulations
- Understand the primary functions of different pharmacy organizations
- Know the top 200 medications and their purpose
- Comply with pharmacy laws, HIPAA/HITECH, CMS, and other healthcare regulations
- Verify medication orders, calculate and measure dosage and prepare and package medications
- Apply knowledge of pharmacology, documentation, and inventory management in the pharmacy
- Adhere to patient-safety, medication-safety, and effective infection control practices
- Understand the different roles of the pharmacy technician
- Perform tasks in and around the pharmacy

Professionalism in Allied Health (v21.12) PS1011

- Gain an understanding of the expectations of an allied healthcare professional in the workplace
- Develop and exercise emotional intelligence, self-management, and interpersonal skills
- Build and improve internal and external communication skills with all exchanges
- Enhance the patient care experience with successful interactions and patient satisfaction
- Maintain solution-oriented conversations, manage conflict, and build self confidence

NASM Personal Trainer and Nutrition Coach - HF 3000

NASM's Essentials of Nutrition Coaching (v22.10) HF3012

- Outline the scope of practice for a Nutrition Coach
- Identify how culture, age, geographic region, and socioeconomic status influence dietary eating patterns
- Explain foundational principles of nutrition science, including metabolism, macronutrients, micronutrients, hydration, alcohol, and nutrient timing
- Describe healthy dietary patterns
- Explain the efficacy and appropriate, safe practices for the recommendation and use of supplements
- Customize communication and the coaching approach in alignment with a client's profile
- Explain the mechanisms and science behind trending diets
- Develop customized, evidence-based nutrition programs for clientele

NASM's Essentials of Personal Fitness Training (v22.10) HF3011

- Identify and adhere to applicable professional standards and codes of conduct including business and professional development practices
- Recognize and apply exercise psychology and behavioral coaching techniques for a wide variety of clients
- Identify concepts and structures of anatomy and physiology, human movement science, exercise metabolism, nutrition, and supplementation
- Select, perform, and interpret results from a client fitness assessment

Patient Care Technician - HI 7000

Electrocardiography (v22.10) HI6012

- Appreciate the role of electrocardiography in the healthcare setting
- Understand the responsibilities of patient care and monitoring, safety, and compliance
- Gain an understanding of the use of appropriate electrocardiography equipment and supplies
- Understand diagnostic cardiac testing to include electrocardiograms, Holter monitors, and stress tests
- Recognize arrhythmias and artifacts with appropriate responses required

Fundamentals of Patient Care (v20.5) HI7011

- Recognize the importance of special care, concerns, and feelings
- Appreciate the role of patient care in the healthcare setting
- Recognize the importance of safety and compliance
- Understand the responsibilities of communication and professionalism
- Gain an understanding of assistance with activities of daily living

Phlebotomy (v22.10) HI6011

- Appreciate the role of the Phlebotomy Technician in patient care, preparation, and venipuncture
- Identify proper organization and utilization of specimen collection equipment and supplies
- Gain an understanding of blood and non-blood collections, handling, transport, and processing
- Recognize the importance of infection control and safety compliance with diagnostic testing
- Understand the responsibilities of teamwork and communication skills in the healthcare setting

Professionalism in Allied Health (v21.12) PS1011

Professionalism in Allied Health (v21.12) PS1011

- Maintain solution-oriented conversations, manage conflict, and build self confidence
- Enhance the patient care experience with successful interactions and patient satisfaction
- Build and improve internal and external communication skills with all exchanges

- Develop and exercise emotional intelligence, self-management, and interpersonal skills
- Gain an understanding of the expectations of an allied healthcare professional in the workplace

MissionCIT

AHA | CPR-BLS For Healthcare Providers

AHA | CPR-BLS For Healthcare Providers Lesson 1

- Define Basic Life Support (BLS) and its role in medical care
- Identify the components of patient assessment (ABCs) within 10 seconds
- Understand and explain the AHA chain of survival
- Demonstrate proper pulse check locations for different age groups
- Perform basic CPR steps including chest compressions and rescue breathing

AHA | CPR-BLS For Healthcare Providers Lesson 2

- Understand airway anatomy and physiology
- Assess airway patency and identify states of airway obstruction
- Demonstrate proper airway opening techniques (Head Tilt Chin Lift and Jaw Thrust)
- Perform proper Bag Valve Mask (BVM) ventilation
- Manage airways in special circumstances (e.g., patients with stomas)
- Monitor ventilation effectiveness using proper techniques

AHA | CPR-BLS For Healthcare Providers Lesson 3

- Differentiate between heart attack, cardiac arrest, and cardiogenic shock
- Perform high-quality CPR with proper compression rate and depth
- Execute correct two-rescuer CPR techniques
- Demonstrate age-specific CPR techniques for infants and children
- Apply CPR in special circumstances (pregnancy, broken ribs)
- Identify situations when to start, continue, and discontinue CPR

AHA | CPR-BLS For Healthcare Providers Lesson 4

- Explain the purpose and function of AEDs
- Demonstrate proper AED operation and pad placement
- Handle special AED situations (hairy/sweaty patients, jewelry, implanted devices)
- Maintain AED equipment properly

- Follow proper protocols for AED use under medical direction

AHA | CPR-BLS For Healthcare Providers Lesson 5

- Identify signs of foreign body airway obstruction (FBAO)
- Perform appropriate response techniques for choking adults
- Execute age-specific obstruction removal techniques for children and infants
- Handle special circumstances in airway obstruction (pregnancy, obesity)
- Respond appropriately to opioid overdose situations

AHA | CPR-BLS For Healthcare Providers Lesson 6

- Understand effective team dynamics in resuscitation
- Define and assign team roles during CPR
- Demonstrate proper team communication techniques
- Participate in post-resuscitation debriefing
- Practice mutual respect and professional attitudes in team settings

AHA | CPR-BLS For Healthcare Providers Lesson 7

- Complete required testing and skills validation
- Understand course completion requirements
- Complete necessary administrative tasks

Emergency Medical Responder - MissionCIT

EMR CH E01: EMS Systems

- Describe the components and structure of the Emergency Medical Services System
- Explain the roles, responsibilities, and professional standards of EMS personnel
- Demonstrate professional behaviors and ethical practices expected of EMS personnel
- Apply quality improvement principles to enhance EMS service delivery
- Identify strategies to ensure patient safety in emergency medical situations

EMR CH E02: The Well-Being of the Emergency Medical Responder

- Apply strategies for maintaining good health as an EMS professional
- Demonstrate practices that support personal well-being in emergency services
- Assess scene safety and identify potential hazards in emergency situations
- Recognize and address emotional needs of patients and responders
- Implement stress management techniques for emergency service professionals

EMR CH E03: Medical Ethics

- Identify legal aspects that govern emergency medical services
- Explain legal accountability and responsibilities of EMS providers
- Describe the components and legal implications of the EMR-patient relationship
- Apply knowledge of advance directives in emergency medical situations
- Demonstrate ethical decision-making in medical emergency scenarios

EMR CH E04: Communications and Documentation

- Apply basic communication principles in emergency medical situations
- Demonstrate effective communication strategies with specific patient groups
- Conduct patient interviews using appropriate questioning techniques
- Complete accurate written documentation and patient care reports
- Operate communication devices and technology used in EMS settings
- Apply key communication and reporting concepts to emergency medical scenarios

EMR CH E05: Anatomy and Physiology

- Apply fundamental elements of the life support chain in emergency care
- Recognize key considerations in anatomy and physiology relevant to emergency medical response
- Identify anatomical planes and directional terms of the body
- Describe the structure and function of the musculoskeletal system
- Explain the structure and function of the respiratory and circulatory systems
- Describe the anatomy and functions of the integumentary system

EMR CH E06: Pathophysiology & Shock

- Explain the pathophysiology of respiratory system disorders and emergencies
- Describe the pathophysiology of shock and its progression

EMR CH E07: Life Span Development

- Describe the developmental characteristics and emergency care considerations for infants
- Identify the developmental characteristics and emergency care considerations for toddlers and preschoolers
- Explain the developmental characteristics and emergency care considerations for school-age children

- Recognize the developmental characteristics and emergency care considerations for early and middle adulthood
- Apply knowledge of primary aging processes and emergency care considerations for older adults

EMR CH E08: Lifting and Moving Patients

- Demonstrate various lifting methods used in emergency medical situations
- Identify and select appropriate categories of patient moves based on emergency conditions
- Perform non-urgent patient moves safely and effectively
- Apply appropriate patient positioning techniques for various medical conditions
- Apply proper body mechanics and safety principles when lifting and moving patients

EMR CH E11: Airway management

- Assess breathing patterns and recognize respiratory distress or failure
- Identify the structures and functions of the respiratory system
- Perform rescue breathing techniques for patients in respiratory arrest
- Adapt airway management techniques for special patient populations
- Recognize and manage airway obstructions in conscious and unconscious patients
- Utilize airway management aids and adjuncts appropriately

EMR CH E12: Respiration and Artificial Ventilation

- Identify the anatomical structures of the respiratory system and their functions
- Explain the physiological processes involved in respiration and gas exchange
- Assess and differentiate between adequate and inadequate respiration in patients
- Recognize the importance of oxygen therapy and potential hazards of oxygen administration
- Identify and properly use oxygen therapy equipment and delivery devices
- Demonstrate proper techniques for administering oxygen to patients
- Differentiate between normal ventilation and positive pressure ventilation techniques

EMR CH E14: Patient Assessment

- Perform a comprehensive scene size-up to ensure safety and identify scene characteristics
- Conduct a primary assessment to identify and manage life-threatening conditions
- Obtain patient history using appropriate interview techniques and SAMPLE/OPQRST methods

- Perform a systematic secondary assessment to identify non-life-threatening injuries and conditions
- Conduct ongoing reassessment to monitor patient status and treatment effectiveness

EMR CH E15: Caring for Common Medical Emergencies - Part 1

- Define medical emergencies and distinguish them from traumatic emergencies
- Assess and manage patients with altered mental status
- Recognize and provide emergency care for patients experiencing seizures
- Identify signs and symptoms of stroke and apply appropriate emergency interventions
- Manage diabetic emergencies including hypoglycemia and hyperglycemia
- Recognize and provide emergency treatment for sepsis and anaphylaxis
- Identify signs of renal failure and provide appropriate emergency care

EMR CH E16: Caring for Common Medical Emergencies - Part 2

- Recognize and manage abdominal and gastrointestinal emergencies
- Apply infection control principles and manage patients with infectious diseases
- Assess and provide emergency care for cardiovascular emergencies
- Identify toxicological emergencies and apply appropriate treatment interventions
- Manage respiratory emergencies and breathing difficulties
- Recognize and provide emergency care for gynecological emergencies including vaginal bleeding
- Assess and manage diseases and emergencies of the eyes, ears, nose, and throat

EMR CH E17: Psychiatric and Behavioral Emergencies

- Define psychiatric and behavioral emergencies and their characteristics
- Perform appropriate assessment and management of patients experiencing psychiatric or behavioral emergencies
- Identify common psychiatric disorders and their manifestations in emergency situations
- Apply special considerations when responding to psychiatric and behavioral emergencies

EMR CH E18: Shock and Resuscitation

- Explain the pathophysiology of shock and cellular perfusion failure
- Identify and differentiate between various types of shock
- Apply appropriate management strategies for patients in shock
- Perform resuscitation techniques including CPR for cardiac arrest patients

- Operate an automated external defibrillator (AED) safely and effectively

EMR CH E19: Trauma

- Explain the mechanisms of trauma and principles of kinetic energy in traumatic injuries
- Assess and manage bleeding and hemorrhage control in trauma patients
- Recognize and provide emergency care for chest trauma and thoracic injuries
- Apply special considerations when managing trauma patients with complex injuries
- Manage multi-system trauma patients using systematic assessment and prioritization

EMR CH E20: Fractures and Dislocations

- Identify types of fractures and provide appropriate emergency care and immobilization
- Recognize dislocations and apply appropriate emergency management techniques
- Identify and manage possible complications associated with fractures and dislocations

EMR CH E21: Soft Tissue Trauma

- Describe the functions of the skin and its role in protecting the body
- Classify burns by type and severity and provide appropriate emergency care
- Perform patient assessment for soft tissue injuries and apply appropriate bandaging and dressing techniques

EMR CH E22: Head, Facial, Neck, and Spine Trauma

- Identify the anatomy and physiology of the head, face, neck, and spine
- Recognize and manage injuries to the brain and skull in emergency situations
- Assess and provide emergency care for spinal injuries while maintaining spinal precautions

EMR CH E23: Environmental Emergencies

- Recognize and manage cold-related environmental emergencies including hypothermia and frostbite
- Identify and provide emergency care for heat-related illnesses including heat exhaustion and heat stroke
- Assess and manage water-related environmental emergencies including drowning and diving accidents
- Respond to other environmental emergencies including bites, stings, and altitude-related conditions

EMR CH E24: Obstetrics and Childbirth

- Explain the stages of childbirth and relevant obstetric terminology

- Assist with emergency childbirth delivery in prehospital settings
- Recognize and manage obstetric complications and emergencies

EMR CH E25: Medical Terminology

- Interpret medical terminology using root words, prefixes, and suffixes

EMR CH E26: Pediatrics

- Identify anatomical and physiological differences between pediatric and adult patients
- Apply an assessment-based approach to pediatric emergency situations
- Recognize and manage airway and respiratory problems in pediatric patients
- Provide emergency care for specific pediatric conditions including shock, seizures, and SIDS

EMR CH E27: Geriatrics

- Identify the characteristics and needs of geriatric patients
- Describe anatomical and physiological changes associated with aging in organ systems
- Identify special assessment findings and considerations unique to geriatric emergencies
- Apply an assessment-based approach when evaluating geriatric patients
- Recognize common medical problems affecting geriatric patients

EMR CH E28: Patients with Special Challenges

- Recognize various types of disabilities and adapt emergency care accordingly
- Apply appropriate communication and care strategies for patients with autism spectrum disorder
- Demonstrate general considerations when providing emergency care to patients with special needs
- Identify diseases and conditions that create special challenges in emergency medical care
- Recognize and safely manage patients with advanced medical devices
- Adapt assessment and treatment techniques for patients with physical impairments
- Recognize signs of abuse and neglect and follow appropriate reporting protocols

EMR CH E29: Transport Operations

- Identify ambulance types, warning devices, and vehicle maintenance requirements
- Apply safety principles and protocols during emergency transport operations
- Describe the phases of an ambulance call and procedural requirements for each phase

- Implement infection-control procedures during patient transport and vehicle operations
- Evaluate the advantages and limitations of air medical transport in emergency situations

EMR CH E30 and E31: Multiple Casualty Incidents

- Define multiple-casualty incidents and their characteristics
- Describe the structure and functions of the Incident Command System
- Apply principles of managing multiple-casualty incidents effectively
- Perform triage procedures to prioritize patient care in mass casualty situations
- Recognize mass-casualty incidents due to terrorism or disaster and their unique challenges
- Apply pre-hospital response protocols for terrorism-related incidents
- Implement disaster management strategies and coordinate multi-agency responses

EMR CH E32: Vehicle Extrication

- Identify equipment and procedures for preparing for vehicle rescue operations
- Perform comprehensive scene size-up for motor vehicle crashes
- Apply vehicle stabilization techniques for different vehicle types and positions
- Demonstrate safe extrication methods and coordinate patient transport from vehicles
- Apply special safety considerations when responding to electric and hybrid vehicle incidents

EMR Chapter 9 R09 | CNS Trauma

- Describe the structure and function of the nervous system as it relates to emergency care
- Explain the types, causes, and mechanisms of traumatic brain injuries
- Recognize and assess injuries to the head and traumatic brain injuries
- Identify signs, symptoms, and management of concussions

Emergency Medical Technician - MissionCIT

Anatomy and Physiology - Lesson 01: Musculoskeletal System

- Understand the concepts and principles of topographic anatomy and how it can serve as a guide for EMTs to locate internal structures
- Identify and describe the three body planes and their use in medical imaging techniques and understanding embryological development

- Identify the different bones, ligaments, tendons, and cartilage that make up the skeletal system and describe their functions
- Differentiate between the axial and appendicular skeletons and describe the bones that make up each
- Understand the structure and functions of the different bones in the skull and spinal column
- Identify the different types of joints and classify them based on the kind of movement they facilitate
- Understand the structure and functions of the muscular system, and differentiate between skeletal, smooth, and cardiac muscles
- Describe the composition of bones and the types of bones that make up the skeletal system

EMT CH 001: EMS Systems

- History and evolution of EMS systems: Understand the factors that led to the creation of modern EMS systems and the principles of resource management, regulations, and policies that govern EMS services.
- EMS licensure, education, and oversight: Identify the different levels of EMS licensure, understand the National EMS Education Agenda for the Future, and explain the role of oversight and clinical protocols in ensuring quality care.
- Roles and responsibilities of EMS personnel: Understand the principles of safety, patient assessment, and emergency care in EMS, as well as the importance of integration with other professionals, administrative support, and professional development.
- Characteristics of professional behavior in EMS: Describe the different characteristics of professional behavior in EMS, their importance in practice, and the principles of patient advocacy, certification, and personal responsibility.
- Patient safety in EMS: Identify high-risk activities in patient safety in EMS, understand how errors happen and how to prevent them through environmental factors, clear protocols, and reflection in action.
- System for continually evaluating and improving care: Explain the principles of continuous quality improvement in EMS and the dynamic process of evaluating and improving EMS care.

EMT CH 003: Medical Ethics

- Evidence Preservation: Understand the importance of preserving evidence in EMS, including the different types of evidence that may be relevant in a given situation.
- Statutory Responsibilities: Understand the legal and statutory responsibilities of EMS personnel, including the need to follow established protocols and guidelines, maintain proper documentation, and comply with reporting requirements.
- Mandatory Reporting: Understand the situations in which mandatory reporting is required, including cases of abuse, neglect, and other forms of misconduct.
- Ethical Principle/Moral Obligations: Understand the difference between ethics and morals, the importance of applying ethical values in EMS, and the potential ethical conflicts that may arise in providing care.
- Consent/Refusal of Care: Understand the different types of consent, legal complications related to consent, and the importance of proper documentation in providing care and ensuring patient safety.
- Confidentiality: Explain the obligation to protect patient information, the Health Information Portability and Accountability Act (HIPAA), the different types of legally mandated reporting requirements, and the potential consequences of breach of confidentiality.
- Advanced Directives: Understand the Patient Self-Determination Act, the different types of advanced directives, and the importance of respecting patient autonomy and wishes.
- Tort and Criminal Actions: Understand the different types of criminal and civil tort actions in EMS, the concept of negligence and the elements that comprise it, the potential defenses against liability, and the importance of mandatory reporting in certain situations.

EMT CH 004: Communications and Documentation

- Understand the uses and types of continuous quality improvement in EMS.
- Identify the sections in a prehospital care report for evaluating and improving EMS care
- Understand the goal of providing a report prior to departing from the hospital and the minimum data set that should be included.
- Know how to keep a copy of the transfer report for reference during the primary prehospital care report and submit the copy with the final prehospital care report.
- Describe the different types and sections of a prehospital care report.
- Understand the importance of the minimum dataset in patient care documentation.

- Identify the different patient information that should be included in a prehospital care report, including administrative information, vital signs, and patient demographics.
- Explain the functions of a prehospital care report, including continuity of care and legal documentation.
- Understand the state reporting requirements and confidentiality policies in documentation.
- Explain how to avoid falsification issues and correct errors in medical documentation.
- Describe the specific areas of difficulty in documentation and how to document patient refusal.
- Explain how to complete a prehospital care report in special situations, including multiple-casualty incidents and exposure or injury situations.

EMT CH 005: Anatomy and Physiology

- Explain how these variations affect life support chain elements and the delivery of emergency medical care.
- Identify the anatomical planes and standard anatomic terms used to describe body systems.
- Describe the skeletal components and joints of the body.
- Explain the function of different types of muscles and the respiratory system.
- Describe the structures and function of the circulatory system, including blood components and the nervous system.
- Explain the structure and function of the integumentary, digestive, endocrine, renal, and reproductive systems.
- Understand the fundamental elements of oxygenation, perfusion, glucose, and waste product removal.
- Explain the issues impacting fundamental elements, such as air composition, airway patency, ventilation mechanics, respiration regulation, and gas transport.
- Understand the effects of blood volume, heart effectiveness, vessel size, and acid on cells and organs.
- Understand the age-related variations in anatomy and body functions for pediatric and geriatric patients.

EMT CH 006: Ventilation, Perfusion & Shock | Understanding Pathophysiology

- Respiratory Compromise: Understand the changes in the structure and function of the thorax, pleural lining, and muscles of ventilation that can cause respiratory compromise, and the effects of inadequate tidal volume and respiratory rate.

- **Composition of Ambient Air:** Describe the various components of ambient air, including oxygen, nitrogen, and carbon dioxide, and understand the significance of the fraction of inspired and delivered oxygen.
- **Patency of the Airway:** Understand the anatomical considerations and potential obstructions at various levels of the airway, including the nasopharynx, oropharynx, pharynx, larynx, trachea, and bronchi.
- **Alteration in Regulation of Respiration Due to Medical or Traumatic Conditions:** Understand the role of chemoreceptors, stretch receptors, and medulla rhythm centers in regulating respiration, and the effects of arterial carbon dioxide and oxygen content on respiration rate and depth.
- **Ventilation/Perfusion (V/Q) Ratio and Mismatch:** Understand the relationship between ventilation and perfusion in the lungs and how disturbance in V/Q ratio can cause hypoxemia.
- **Perfusion and Shock:** Understand the composition of blood, distribution of blood volume, and the role of hydrostatic pressure and plasma oncotic pressure in perfusion, and the factors that can impair cardiac output and cause shock.
- **Microcirculation:** Understand the influence of local, neural, and hormonal factors on capillary function and blood pressure.
- **Alteration of Cell Metabolism:** Understand the difference between aerobic and anaerobic metabolism, the effects of an acidic environment on cell structure and function, and the effects of inadequate perfusion on cell metabolism and function.
- **Blood Pressure:** Understand the role of cardiac output, systemic vascular resistance, and baroreceptors in blood pressure regulation, and the effects of changes in cardiac output and systemic vascular resistance on blood pressure.

EMT CH 007: Life Span Development

- **Toddler (12 to 36 Months) and Preschool Age (3 to 5):** Recognize the physiological and cognitive development of toddlers and preschool-age children, their vital signs, toilet training patterns, and psychosocial behaviors.
- **School-Age Children (6 to 12 Years):** Understand the physiological changes in school-age children, including vital signs and tooth replacement, and the development of self-concept and self-esteem.
- **Adolescence (13 to 18 Years):** Recognize the physiological changes in adolescents, including vital signs, growth spurt, endocrine changes, and psychological development, including peer pressure and self-destructive behaviors.

- Early Adulthood (20 to 40 Years): Identify and understand the physiological and psychological changes in early adulthood, including peak physical conditioning, job stress, and romantic love.
- Middle Adulthood (41 to 60 Years): Recognize the physiological changes in middle adulthood, including vital signs, cardiovascular health, weight control, and hearing and vision changes, and the psychological challenges of empty nest syndrome and financial burdens.
- Infancy (Birth to 1 Year): Identify and understand the vital signs, physiological and immunological development, and psychosocial behaviors of infants during their first year of life.
- Late Adulthood (61 Years and Older): Understand the physiological changes in late adulthood, including vital signs, cardiovascular and respiratory changes, sensory losses, and endocrine and gastrointestinal changes, and the psychological challenges of declining well-being and financial burdens.

EMT CH 008: Principles of Pharmacology

- Kinds of medications used in an emergency: Identify the different forms and routes of medication administration, including pills, tablets, inhalation, liquids, enteral and parenteral administration, sublingual, oral, inhaled, and injection methods.
- Basic medication terminology: Understand the difference between generic and trade drug names.
- Drug profile: Describe the actions, pharmacodynamics, indications, intended and unintended effects, contraindications, side effects, untoward effects, dose, route, and prescribing information of medications.
- Medication safety: Understand the importance of medication safety in emergency medicine and the principles of safe medication administration.

EMT CH 009: Medical Terminology

- Standard Medical Abbreviations and Acronyms: Identify standard medical abbreviations and acronyms used in healthcare settings and understand their meanings.
- Medical Terminology: Understand the different types of medical terminology including prefixes, root words, suffixes, and combining forms.
- Medical Terms Associated with Body Structure: Identify medical terms associated with different parts of the body including bones, muscles, organs, and tissues.

- Medical Terms Associated with Body Systems: Identify medical terms associated with different body systems including the cardiovascular, respiratory, digestive, and nervous systems.
- Medical Terms Associated with Body Direction or Position: Identify medical terms associated with different body directions and positions including anterior, posterior, medial, and lateral.

EMT CH 010: CPR

- Understand Elements of Basic Life Support
- Understand Airway Management
- Understand CPR Skills
- Understand A E D
- Understand how to manage Foreign Body Airway Obstruction
- Understand Team Dynamics

EMT CH 011: Airway management

- Identify the signs of adequate and inadequate airway and their corresponding conditions (e.g., open airway, speaking in full sentences, unusual breathing sounds, tongue or airway obstruction, swelling due to trauma or infection).
- Understand the anatomy of the upper and lower airway tract, including the functions and structures of the nose, mouth, tongue, jaw, pharynx, larynx, epiglottis, vocal cords, thyroid cartilage, cricoid ring, trachea, bronchi, bronchioles, and alveoli.
- Describe the pulmonary capillary beds and how they function in the exchange of oxygen and carbon dioxide.
- Explain the techniques used to assure a patent airway, including manual airway maneuvers and mechanical airway devices.
- Describe the purpose, indications, contraindications, complications, and procedures of nasopharyngeal airway maneuvers.
- Explain the procedures for relief of foreign body airway obstruction and upper airway suctioning.
- Understand the age-related variations in airway assessment and management for pediatric and geriatric patients.

EMT CH 012: Respiration and Artificial Ventilation

- Explain oxygen therapy in patients with suspected a acute coronary syndrome
- Oxygenation of chest pain and stroke patients

EMT CH 013: LVAD

- Understand Left Ventricular Assist Devices | History & Overview
- Understand LVAD Functionality
- Understand Status, Alarms, Actions
- Understand Controls for Different LVADs
- Understand LVAD Patient Assessment

EMT CH 014: Patient Assessment

- Size-up the scene and determine if additional or specialized resources are required
- Quickly identify and protect oneself from violent or hazardous situations
- Assess the patient to understand the problem, so appropriate care can be given

EMT CH 016: Gastrointestinal and Urologic Emergencies

- Define acute abdomen and identify the anatomy of the organs of the abdominopelvic cavity, including the stomach, intestines, esophagus, spleen, urinary bladder, liver, gall bladder, pancreas, kidney, and reproductive organs.
- Describe the assessment techniques and symptoms of an acute abdomen, including inspection, palpation, normal and abnormal findings (e.g., nausea/vomiting, change in bowel habits, pain, tenderness, guarding, distension), and other related symptoms (e.g., dark tarry stool, belching/flatulence, concurrent chest pain, urination).
- Explain the general management for patients with an acute abdomen, including scene safety and standard precautions, airway, ventilatory, and circulation support, positioning, and emotional support.
- Describe specific acute abdominal conditions, their causes, assessment findings and symptoms, complications, and specific prehospital management, such as acute and chronic gastrointestinal hemorrhage, peritonitis, and ulcerative diseases.
- Consider age-related variations for pediatric and geriatric assessment and management, including the anatomic and physiologic differences in children, pathophysiology, assessment, physical findings, and management strategies for conditions like vomiting, GI bleeding, and appendicitis.
- Explain the importance of communication and documentation for patients with an abdominal or gastrointestinal condition or emergency, including the use of appropriate medical terminology, accurate and timely reporting of assessment findings and symptoms, and proper documentation of interventions and treatments.

- Identify appropriate transport decisions for patients with an acute abdomen, taking into account factors like the severity of the condition, the availability of specialized medical care, and the potential risks and benefits of different transport options.

EMT CH 017: Neurologic Emergencies

- Understand the importance of communication and documentation in EMS care, including effective communication with patients, families, and other healthcare providers, and accurate and complete documentation of assessment findings, interventions, and transport decisions.
- Explain the importance of rapid transport to appropriate facilities for patients with stroke/TIA, seizures, altered mental status, and other conditions that require urgent medical attention.
- Understand the causes of stroke/TIA, including hemorrhage and clot, and review the anatomy and function of the brain and cerebral blood vessels.
- Identify the assessment findings and symptoms of stroke/TIA, such as confusion, weakness, facial drooping, difficulty speaking, and headache, and explain the Stroke Alert Criteria and Cincinnati Prehospital Stroke Scale used to diagnose it.
- Explain the management of patients with stroke/TIA, including ensuring scene safety and standard precautions, assessing ABCs/position, providing oxygen/suction, offering emotional support, and arranging for rapid transport.
- Describe the incidence and causes of seizures, and identify the different types of seizures, including generalized tonic-clonic, tonic, clonic, and partial seizures.
- Identify the assessment findings and symptoms of seizures, such as spasms, muscle contractions, and incontinence, and explain the management of seizures, including ensuring safety/positioning, assessing ABCs, providing oxygen/suction, and offering emotional support.
- Understand the causes and assessment findings and symptoms of headache, both as a symptom and as a neurological condition, and describe its management.
- Explain the age-related variations in pediatric and geriatric assessment and management, including the epidemiology, anatomic and physiologic differences, causes of altered mental status, and management strategies for stroke/TIA, seizures, and altered mental status in children and stroke in older adults.

EMT CH 018: Respiratory Emergencies

- Identify and describe the causes, assessment findings and symptoms, complications, and prehospital management of specific respiratory conditions, such as asthma,

pulmonary edema, chronic obstructive pulmonary disease, pneumonia, spontaneous pneumothorax, pulmonary embolism, epiglottitis, pertussis, cystic fibrosis, and viral respiratory infections.

- Describe the importance of effective communication and documentation for patients with respiratory emergencies.
- Consider age-related variations in pediatric and geriatric assessment and management, including upper and lower airway obstruction, pneumonia, chronic conditions such as COPD, croup, foreign body aspiration, epiglottitis, asthma, bronchiolitis, pertussis, and cystic fibrosis.
- Understand the EMT role in assisting with the administration of metered-dose inhalers and small volume nebulizers, including indication/contraindications, actions, side effects, dose and route, and medical control role.
- Understand the transport decisions involved in respiratory emergencies.
- Identify the anatomy of the respiratory system, including the upper and lower airway, lungs, and accessory structures.
- Understand the normal respiratory effort and the assessment findings and symptoms of respiratory distress, including shortness of breath, restlessness, changes in respiratory rate or rhythm, skin color changes, abnormal sounds of breathing/lung sounds, inability to speak, retractions, altered mental status, abdominal breathing, coughing, and the tripod position.
- Explain the prehospital management of respiratory distress, including scene safety and standard precautions, ABCs, positioning, oxygen/suction, pulse oximetry, emotional support, and transport.

EMT CH 019: Cardiac Emergencies

- Identify the anatomy of the cardiovascular system, including the heart chambers, valves, blood supply to myocardium, specialized electrical cells, automaticity, autonomic system control, vessels, blood components, and pulse.
- Recognize age-related variations in cardiac emergencies for pediatric and geriatric patients, including cardiac problems associated with congenital heart condition, cardiovascular compromise caused by respiratory compromise, and typical MI presentations related to other underlying disease processes such as diabetes, asthma, and COPD.
- Understand the physiology of the cardiovascular system, including the cardiac cycle, blood circulation through a double pump, oxygenation of tissues, delivery of oxygenated blood, and removal of tissue wastes.

- Understand the pathophysiology of cardiac compromise, atherosclerosis, rate-related compromise, and assessment of primary and secondary surveys, and evaluation of management of cardiac emergencies.
- Identify the pharmacological agents used in cardiac emergencies, including aspirin and nitroglycerin, and understand their indications, contraindications, actions, side effects, precautions, dosage, administration, and documentation.

EMT CH 020: Diabetic and Endocrine Emergencies

- Identify the definition of terms related to diabetes, including types I and II, hypoglycemia, hyperglycemia, diabetic ketosis, and anatomy and function of the pancreas.
- Describe the general assessment findings and symptoms of diabetes, including confusion, vertigo, headache, syncope, decreasing or increasing levels of consciousness, visual changes, speech changes, and movement and sensation changes.
- Describe the pathophysiology, causes, history, and assessment findings of hyperglycemia/diabetic ketoacidosis, including onset, Kussmaul's breathing, acetone breath, dehydration, weakness, nausea, vomiting, polyuria, polydipsia, polyphagia, and management.
- Identify the causes, history, and assessment findings of hypoglycemia, including onset, bizarre behavior, tremors, shaking, sweating, hunger, and management.
- Explain the indication, contraindications, actions, side effects, dose and route, and medical control role of oral glucose, and considerations for age-related variations in pediatric and geriatric assessment and management.
- Describe the communication and documentation protocols related to diabetes management.
- Explain the transport decisions related to rapid transport for altered level of consciousness in diabetes management.

EMT CH 021: Allergic Reaction

- Define acute abdomen and identify common causes.
- Describe the fundamental pathophysiology of allergic reactions, including increased capillary permeability, vasodilation, bronchoconstriction, and increased mucus production.
- Identify assessment findings for allergic reactions and anaphylaxis, including respiratory, cardiovascular, skin, and other symptoms.

- Describe the management of allergic reactions and anaphylaxis, including the ABCs, positioning, oxygen therapy, emotional support, assisting with autoinjectors, removing allergens, and administering epinephrine.
- Identify indications, contraindications, actions, and side effects of epinephrine as a treatment for allergic reactions.
- Describe the importance of effective communication and documentation in transport decisions for patients with allergic reactions.
- Explain age-related variations in pediatric and geriatric assessment and management of allergic reactions.

EMT CH 022: Environmental Injuries

- Learn to assess and manage patients who suffer from drowning or submersion incidents, including hypoxia, cold water submersion, and spinal trauma.
- Recognize and treat cold- and heat-related illnesses, such as hypothermia, frostbite, heat stroke, and dehydration.
- Bites and envenomations: Identify and manage bites and envenomations from spiders, snakes, and insects, including anaphylactic reactions.
- Understand the mechanism of injury, signs and symptoms, and appropriate management for dysbarism in SCUBA divers.
- Recognize the unique assessment and management considerations for pediatric and geriatric patients.
- Know how to assess and manage patients with electrical injuries, including recognizing the risk of cardiac arrest.
- Understand the effects of radiation exposure and appropriate management strategies.

EMT CH 036: Abdominal and Genitourinary Injuries

- Identify the anatomy and physiology of the abdomen, including its quadrants and boundaries, surface anatomy, and various organs and structures.
- Define the different types of injuries in abdominal trauma, including closed and penetrating trauma, their mechanisms of injury, signs and symptoms, and considerations.
- Describe the general assessment and management of abdominal trauma, including a high index of suspicion, assessment of external and internal hemorrhage, identification and management of life threats, physical exam, recognition and prevention of shock, use of PASG for pelvic fracture stabilization, transportation decisions, and communication and documentation considerations.

- Identify the age-related variations for pediatric and geriatric assessment and management of abdominal trauma.
- Identify the special considerations in cases of abdominal trauma, including sexual assault, patient confidentiality, and vaginal bleeding due to trauma.
- Describe the incidence, morbidity, and mortality of abdominal trauma, including its contributing factors.

EMT CH 037: Orthopedic Injuries

- Understand the anatomy and physiology of the musculoskeletal system, including the function of support, ligaments, tendons, cartilage, joints, flexion, extension, and rotation.
- Identify the different types of musculoskeletal injuries and their incidence, including upper and lower extremity injuries, pediatric and geriatric considerations, and mechanisms of injury.
- Understand the different complications that can arise from musculoskeletal injuries, such as hemorrhage, instability, loss of tissue, contamination, long-term disability, interruption of blood supply, and pregnancy with pelvic fracture.
- Develop skills to assess and manage musculoskeletal injuries, including principles of scene safety, splinting, neurologic and circulatory examination, pain management, immobilization, transportation, communication, and documentation.
- Understand the different types of splints used for musculoskeletal injuries, including rigid, formable, traction, air, vacuum, pillow/blanket, short spine board, and long spine board.
- Recognize age-related variations in pediatric and geriatric assessment and management of musculoskeletal injuries.

OSHA for Emergency Medical Technicians

OSHA CH 01: HazCom

- Understand What is HazCom?
- Understand Implementing HazCom
- Understand Decontamination
- Understand Training and PPE for EMS Responders

OSHA CH 02: Lockout Tagout

- Understand Lockout Tagout Procedures
- Understand Handling Machines

- Understand Employee Training
- Understand Starting with the Basics

OSHA CH 03: Airborne Pathogens

- Understand Protecting Against Airborne Pathogens
- Understand Specific Airborne Diseases
- Understand What are infectious diseases?

OSHA CH 04: Bloodborne Pathogens

- Understand Bloodborne Pathogens and Exposure
- Understand FAQs on OSHA Standards
- Understand OSHA Standards for Controlling Bloodborne Pathogens

Open Textbooks

Breaking the Chain of Transmission Game

An Interprofessional Virtual Gaming Simulation: Breaking the Chain of Transmission

- Apply interprofessional communication skills to foster collaboration and provide safe client care
- Demonstrate knowledge and skills related to infection prevention and control practices
- Identify high risk areas to break the chain of transmission.

Anatomy & Physiology

Anatomy & Physiology 01: Introduction

- Compare and contrast the study of anatomy and physiology
- Describe the structure of the body, from simplest to most complex
- Define homeostasis and explain its importance to normal human functioning
- Use appropriate anatomical terminology to identify key body structures, body regions, and directions in the body
- Compare and contrast imaging techniques in terms of their function and use in studying the human body

Anatomy & Physiology 02: The Chemical Level of Organization

- Describe the fundamental composition of matter
- Identify the three subatomic particles
- Identify the four most abundant elements in the body

- Explain the relationship between an atom's number of electrons and its relative stability
- Distinguish between ionic bonds, covalent bonds, and hydrogen bonds
- Explain how energy is invested, stored, and released via chemical reactions, particularly those reactions that are critical to life
- Explain the importance of the inorganic compounds that contribute to life, such as water, salts, acids, and bases
- Compare and contrast the four important classes of organic (carbon-based) compounds—proteins, carbohydrates, lipids and nucleic acids—according to their composition and functional importance to human life

Anatomy & Physiology 03: The Cellular Level of Organization

- Describe the structure and function of the cell membrane, including its regulation of materials into and out of the cell
- Describe the functions of the various cytoplasmic organelles
- List the morphological and physiological characteristics of some representative cell types in the human body
- Explain the structure and contents of the nucleus, as well as the process of DNA replication
- Discuss how a cell differentiates and becomes more specialized
- Explain the process by which a cell builds proteins using the DNA code
- List the stages of the cell cycle in order, including the steps of cell division in somatic cells

Anatomy & Physiology 04: The Tissue Level of Organization

- Describe the characteristics of nervous tissue and how these enable the unique functions of nervous tissue.
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- Describe the characteristics of muscle tissue and how these dictate muscle function.
- Identify the main tissue types and discuss their roles in the human body.
- Describe the structural characteristics of the various epithelial tissues and how these characteristics enable their functions.
- Describe the structural characteristics of the various connective tissues and how these characteristics enable their functions.
- Describe the process of tissue response to injury.

Anatomy & Physiology 05: The Integumentary System New Learning Object

- Describe the integumentary system and the role it plays in homeostasis
- Describe the layers of the skin and the functions of each layer
- Describe the accessory structures of the skin and the functions of each
- Describe the functions of the integumentary system
- Describe the changes that occur in the integumentary system during the aging process
- Discuss several common diseases, disorders, and injuries that affect the integumentary system

Anatomy & Physiology 06: Bone Tissue and the Skeletal System

- Discuss the process of bone formation and development
- Explain how bone repairs itself after a fracture
- Discuss the effect of exercise, nutrition, and hormones on bone tissue
- Describe how an imbalance of calcium can affect bone tissue
- List and describe the functions of the skeletal system
- Describe the classes of bones
- Describe the microscopic and gross anatomical structures of bones

Anatomy & Physiology 07: Axial Skeleton

- Discuss the vertebral column and regional variations in its bony components and curvatures
- Describe the components of the thoracic cage
- Discuss the embryonic development of the axial skeleton
- Describe the functions of the skeletal system and define its two major subdivisions
- Identify the bones and bony structures of the skull, the cranial suture lines, the cranial fossae, and the openings in the skull

Anatomy & Physiology 08: The Appendicular Skeleton

- Describe the bones of the lower limb, including the bones of the thigh, leg, ankle, and foot
- Describe the embryonic formation and growth of the limb bones
- Describe the bones of the pectoral girdle, and describe how the girdle unites the upper limbs with the axial skeleton
- Describe the bones of the upper limb, including the bones of the arm, forearm, wrist, and hand

- Describe the bones of the pelvic girdle, and describe how the pelvis unites the lower limbs with the axial skeleton.

Anatomy & Physiology 09: Joints

- Discuss both functional and structural classifications for body joints
- Describe the characteristic features for fibrous joints and give examples
- Describe the characteristic features for cartilaginous joints and give examples
- Describe the characteristic features for synovial joints and give examples
- Define and identify the different body movements
- Discuss the structure of specific body joints and the movements allowed by each
- Explain the development of body joints

Anatomy & Physiology 10: Muscle Tissue

- Describe structural and functional differences of skeletal, cardiac, and smooth muscle tissue
- Describe the structure and function of skeletal muscle fibers
- Explain the process involved with initiating muscle contraction and relaxation
- Explain how the nervous system is able to regulate force generation in skeletal muscle
- Describe the types of skeletal muscle fibers
- Relate the connections between exercise and muscle performance
- Understand the structure and function of smooth muscle tissue
- Explain the development and regeneration process of muscle tissue

Anatomy & Physiology 11: The Muscular System

- Describe the actions and roles of agonists and antagonists
- Explain the structure and organization of muscle fascicles and their role in generating force
- Explain the criteria used to name skeletal muscles
- Identify the skeletal muscles and their actions on the skeleton and soft tissues of the body
- Identify the origins and insertions of skeletal muscles and the prime movements

Anatomy & Physiology 12: The Nervous System and Nervous Tissue

- Relate the anatomical structures to the basic functions of the nervous system.
- Explain how neurons and glial cells work together to perform and support the nervous system functions.
- Describe the pathway involved with neural sensation, integration and motor response.

- Describe signal conduction at chemical synapses.
- Link how movement of ions across the neuron membrane creates membrane potentials.

Anatomy & Physiology 13: The Peripheral Nervous System

- Describe different types of sensory receptors
- Describe the structures found in the PNS
- Name and describe the sensory and motor functions of the cranial and spinal nerves
- Explain the arrangement of gray and white matter in the spinal cord
- Describe several reflex arcs and their functional roles
- Describe the arrangement of sensory and motor regions in the spinal cord

Anatomy & Physiology 14: The Central Nervous System

- Describe the growth and differentiation of the neural tube
- Relate the different stages of development to the adult structures of the central nervous system
- Explain the expansion of the ventricular system of the adult brain from the central canal of the neural tube
- Describe the connections of the diencephalon and cerebellum on the basis of patterns of embryonic development

Anatomy & Physiology 15: The Special Senses

- Describe the structures responsible for the special sense of taste.
- Distinguish how different tastes are transduced.
- Describe the structures responsible for the special senses of smell
- Describe the structures responsible for the special senses of hearing.
- Describe the means of mechanoreception for hearing
- Describe the structures responsible for the special senses of vision
- List the supporting structures around the eye and describe the structure of the eyeball.
- Describe the processes of phototransduction

Anatomy & Physiology 16: The Autonomic Nervous System

- Describe the components of the autonomic nervous system
- Differentiate between the structures of the sympathetic and parasympathetic divisions in the autonomic nervous system
- Name the components of a visceral reflex specific to the autonomic division to which it belongs

- Predict the response of a target effector to autonomic input on the basis of the released signaling molecule
- Describe how the central nervous system coordinates and contributes to autonomic functions

Anatomy & Physiology 17: The Endocrine System

- Identify the contributions of the endocrine system to homeostasis
- Discuss the chemical composition of hormones and the mechanisms of hormone action
- Summarize the site of production, regulation, and effects of the hormones of the pituitary, thyroid, parathyroid, adrenal, and pineal glands
- Discuss the hormonal regulation of the reproductive system
- Explain the role of the pancreatic endocrine cells in the regulation of blood glucose
- Identify the hormones released by the heart, kidneys, and other organs with secondary endocrine functions
- Discuss several common diseases associated with endocrine system dysfunction
- Discuss the embryonic development of, and the effects of aging on, the endocrine system

Anatomy & Physiology 18: The Cardiovascular System: Blood

- Identify the primary functions of blood, its fluid and cellular components, and its characteristics
- Describe the formation of the formed element components of blood
- Discuss the structure and function of red blood cells and hemoglobin
- Classify and characterize white blood cells
- Describe the process of hemostasis
- Explain the significance of AB and Rh blood groups in blood transfusions
- Discuss a variety of blood disorders

Anatomy & Physiology 19: The Cardiovascular System: The Heart

- Describe the location of the heart and its internal and external features
- Describe the path of blood through the cardiac circuits
- Explain how blood flows through the coronary circulation and why this is necessary for cardiac function
- Describe the anatomy of cardiac muscle
- Explain how the cardiac conduction system controls cardiac muscle contraction

- Describe the process and purpose of an electrocardiogram
- Summarize and explain the connection between the various events of the cardiac cycle
- Describe factors that effect cardiac output and be able to calculate it
- Describe the effects of exercise on cardiac output and heart rate
- Identify cardiovascular centers and cardiac reflexes that regulate heart function
- Describe how heart rate, stroke volume, contractility, and the Frank-Starling mechanism affect cardiac output
- Identify the factors affecting heart rate and stroke volume
- Describe fetal heart development

Anatomy & Physiology 20: The Cardiovascular System: Blood Vessels and Circulation

- Compare and contrast the anatomical structure of arteries, arterioles, capillaries, venules, and veins
- Accurately describe the forces that account for capillary exchange
- List the major factors affecting blood flow, blood pressure, and resistance
- Describe how blood flow, blood pressure, and resistance interrelate
- Discuss how the neural and endocrine mechanisms maintain homeostasis within the blood vessels
- Describe the interaction of the cardiovascular system with other body systems
- Label the major blood vessels of the pulmonary and systemic circulations
- Identify and describe the hepatic portal system
- Describe the development of blood vessels and fetal circulation
- Compare fetal circulation to that of an individual after birth

Anatomy & Physiology 21: The Lymphatic and Immune System

- Identify the components and anatomy of the lymphatic system
- Discuss the role of the innate immune response against pathogens
- Describe the power of the adaptive immune response to cure disease
- Explain immunological deficiencies and over-reactions of the immune system
- Discuss the role of the immune response in transplantation and cancer
- Describe the interaction of the immune and lymphatic systems with other body systems

Anatomy & Physiology 22: The Respiratory System

- List the structures of the respiratory system
- List the major functions of the respiratory system

- Outline the forces that allow for air movement into and out of the lungs
- Outline the process of gas exchange
- Summarize the process of oxygen and carbon dioxide transport within the respiratory system
- Create a flow chart illustrating how respiration is controlled
- Discuss how the respiratory system responds to exercise
- Describe the development of the respiratory system in the embryo

Anatomy & Physiology 23: The Digestive System

- Describe the functional histology of the alimentary canal
- Describe the processes and control of ingestion, propulsion, mechanical digestion, chemical digestion, absorption, and defecation
- Describe the functional anatomy and digestive processes of the mouth, pharynx, and esophagus
- Describe the functional anatomy and digestive processes of the stomach
- Describe the functional anatomy and digestive processes of the liver, pancreas, and gall bladder
- Describe the functional anatomy and digestive processes of the small and large intestines
- Describe digestion and absorption of carbohydrates, proteins, lipids, nucleic acids, minerals, vitamins, and water

Anatomy & Physiology 24: Metabolism and Nutrition

- Describe lipid metabolism and its importance for the body
- Describe protein metabolism and its importance for the body
- Explain the processes that regulate glucose levels during the absorptive and postabsorptive states
- Explain how metabolism is essential to maintaining body temperature (thermoregulation)
- Summarize the importance of vitamins and minerals in the diet
- Describe the processes involved in anabolic and catabolic reactions
- Describe carbohydrate metabolism and its importance for the body

Anatomy & Physiology 25: The Urinary System

- Describe the macroscopic and microscopic anatomy of the kidney
- Describe the anatomy of the nephron.

- Describe the mechanism and control of glomerular filtration
- Describe the processes involved in urine formation
- Explain how the kidney reclaims filtered substances (reabsorption).
- Explain how the kidney removes unfiltered substances from the blood (secretion).
- Describe how the medullary concentration gradient is formed and maintained.
- Describe how the kidney can produce a concentrated or dilute urine using hormones.
- Explain how the kidney alters blood volume and composition.
- Describe the anatomy of the urinary system and its role in urine storage and transport.
- Explain the integrative influences of kidney function on the body.

Anatomy & Physiology 26: Fluid, Electrolyte, and Acid-Base Balance

- Identify the body's main fluid compartments
- Identify the normal range of blood pH and name the conditions where one has a blood pH that is either too high or too low
- Describe the body's compensatory mechanisms for acidosis and alkalosis
- Describe how fluid and solutes move between compartments
- Define plasma osmolality and identify two ways in which plasma osmolality is maintained
- Describe how ADH is involved in regulating water output
- Identify the six ions most important to the function of the body
- Describe how sodium, potassium, calcium, and phosphate are regulated
- Define buffer and discuss the role of buffers in the body
- Explain why bicarbonate must be conserved rather than reabsorbed in the kidney

Anatomy & Physiology 27: The Sexual Systems

- Describe the structure and general functions of the organs of sexual systems
- Explain how bipotential tissues are directed to develop into sex organs
- Name the rudimentary duct systems in the embryo that are precursors to internal sex organs
- Describe the hormonal changes that bring about puberty, and the secondary sex characteristics
- Explain the events during spermatogenesis that produce haploid sperm from diploid cells
- Identify the importance of testosterone in male reproductive function
- Explain how bipotential tissues are directed to develop into male or female sex organs

- Name the rudimentary duct systems in the embryo that are precursors to male or female internal sex organs
- Describe the hormonal changes that bring about puberty, and the secondary sex characteristics of men and women

Anatomy & Physiology 28: Development and Inheritance

- List and explain the steps involved in fertilization
- Describe the major events in embryonic development
- Describe the major events in fetal development
- Summarize the physiology of lactation
- Classify and describe the different patterns of inheritance
- Discuss the adaptations of a woman's body to pregnancy
- Describe the physiologic adjustments that the newborn must make in the first hours of extrauterine life

AP- 06.0 Bone Tissue and the Skeletal System

- List and describe the functions of the skeletal system
- Describe the classes of bones
- Describe the microscopic and gross anatomical structures of bones
- Discuss the process of bone formation and development
- Explain how bone repairs itself after a fracture
- Discuss the effect of exercise, nutrition, and hormones on bone tissue
- Describe how an imbalance of calcium can affect bone tissue

AP- 09.0 Joints

- Discuss both functional and structural classifications for body joints
- Describe the characteristic features for fibrous joints and give examples
- Describe the characteristic features for cartilaginous joints and give examples
- Describe the characteristic features for synovial joints and give examples
- Define and identify the different body movements
- Discuss the structure of specific body joints and the movements allowed by each
- Explain the development of body joints

Comprehensive Midwifery: The role of the midwife in health care practice, education, and research

Comprehensive Midwifery 01: Health Care Context

- Critically analyze how birth has been represented in different forms of art throughout history, and understand how these representations have shaped cultural attitudes towards childbirth
- Explain the importance of human rights in midwifery care, and identify strategies for promoting and protecting these rights in practice.
- Describe the scope of midwifery practice and its role in maternal and child health, including the benefits and limitations of midwifery care.
- Apply health policy analysis frameworks to evaluate the impact of policy decisions on midwifery care and identify areas for advocacy and reform.
- Articulate the significance of interdisciplinary collaboration in midwifery and its potential to improve maternal and child health outcomes.

Comprehensive Midwifery 02: As Practitioner

- Demonstrate competence in midwifery practice, including providing care throughout the childbirth continuum and promoting health and wellness for pregnant and postpartum clients.
- Communicate effectively with clients, colleagues, and other healthcare professionals, using a client-centered approach to support informed decision-making and positive outcomes.
- Work collaboratively and respectfully with diverse clients and colleagues, recognizing and addressing differences related to culture, gender, sexuality, and other social identities.
- Navigate the professional framework for midwifery practice in Canada, including regulatory requirements, standards of practice, and ethical considerations.
- Engage in reflective practice and ongoing professional development, utilizing feedback, self-assessment, and evidence-based approaches to improve the quality of their care and promote positive outcomes for clients.

Comprehensive Midwifery 03: As Educator

- Design and implement effective health education and promotion strategies for diverse populations, using evidence-based approaches and principles of health literacy.
- Evaluate and apply different approaches to midwifery education, including traditional apprenticeship models, academic programs, and continuing education opportunities.

- Articulate the roles and responsibilities of academic midwives as scholars, educators, and researchers, and identify opportunities for contributing to the advancement of midwifery knowledge and practice.
- Develop and deliver midwifery education content and programs that are grounded in adult learning theory, culturally responsive, and responsive to the needs and experiences of diverse learners.
- Critically evaluate midwifery education and training programs, identifying areas for improvement and advocating for the development of rigorous and comprehensive educational standards for the profession.

Comprehensive Midwifery 04: As Researcher

- Identify, evaluate, and apply relevant research evidence to support evidence-based practice and evidence-informed midwifery care.
- Articulate the role of midwives as researchers, including the potential benefits of engaging in research for advancing the profession and improving maternal and child health outcomes.
- Develop and implement research projects related to midwifery practice, utilizing appropriate research methods and ethical considerations.
- Critically evaluate research studies in midwifery and related fields, identifying strengths, limitations, and implications for practice and policy.

Foundations for Assisting in Home Care

HLTH 07: Foundations for Assisting in Home Care

- Understand the history, definition, and team structure of home care, as well as the vital role played by Home Health Aides/Personal Care Aides in the home care team and the range of tasks they may perform.
- Understand the physical and psychological needs of patients, the influence of culture on healthcare practices and values, effective communication skills, documentation of care, identification of different types of abuse and ways to protect patient rights, including confidentiality and privacy.
- Understand the special needs and challenges faced by elderly patients, including the physical and psychological changes that come with aging
- Provide appropriate care that meets their unique needs while taking into consideration societal attitudes towards aging.
- Understand the physical and psychological development of children from infancy to adolescence and how this impacts their home care needs.

- Help children and teenagers manage stress and develop positive coping skills.
- Understand the concepts of mental health and mental illness, with a focus on specific mental health issues such as anxiety, depression, and schizophrenia.
- Understand what developmental disabilities are, including causes and how they affect a person's functioning.
- Work with patients who have developmental disabilities to help them achieve independence to the fullest extent possible.
- Understand the concept of physical disabilities, including their causes and how they differ from developmental disabilities.
- Understand the basics of nutrition, including the role of major nutrients such as carbohydrates, protein, and fats in physical well-being.
- Plan nutritious meals using the USDA's ChooseMyPlate guidelines, as well as different dietary needs such as low salt, low fat, vegetarian, gluten-free, and mechanical diets for individuals with swallowing difficulties.
- Understand how Home Health Aides/Personal Care Aides can assist patients in managing their finances and developing a budget.
- Help patients track expenses and plan a budget based on income and household expenditures.
- Understand the importance of housekeeping and how to perform it effectively as a Home Health Aide/Personal Care Aide.
- Use proper body mechanics to prevent injury, develop task lists, and prioritize tasks.
- Perform specific housekeeping tasks in each room of the home, including the kitchen, bathroom, bedroom, and living room.
- Understand the types of injuries that can occur in the home, such as falls, burns, cuts, poisoning, choking, and fires, and how to prevent them as a Home Health Aide/Personal Care Aide.
- Deal with serious medical emergencies, including heart attacks, seizures, and strokes.
- Provide personal care to home care patients, including infection control, bathing, teeth and mouth care, dressing and grooming, assisting with eating, toileting, transferring, self-administration of medication, and infant care.

Introduction to Health Assessment for the Nursing Professional

00: INTRODUCTION TO HEALTH ASSESSMENT FOR THE NURSING PROFESSIONAL:

Introduction

- Completion

01: INTRODUCTION TO HEALTH ASSESSMENT FOR THE NURSING PROFESSIONAL:

Chapter 1 - Introduction to Health Assessment

- Understand the role of health assessment.
- Apply the cognitive steps of clinical judgment.
- Understand approaches to health assessment.
- Recognize the role health promotion plays in health assessment.

02: INTRODUCTION TO HEALTH ASSESSMENT FOR THE NURSING PROFESSIONAL:

Inclusive Approaches to Health Assessment

- Define key principles of inclusive health assessment.
- Outline an anti-oppressive approach to inclusive health assessment.
- Describe the concept of inclusive health assessment.

03: INTRODUCTION TO HEALTH ASSESSMENT FOR THE NURSING PROFESSIONAL:

Respiratory System

- Apply subjective assessment skills.
- Apply objective assessment skills.
- Use clinical judgment.
- Integrate health promotion interventions into actions.
- Integrate an inclusive approach to respiratory assessment.

04: INTRODUCTION TO HEALTH ASSESSMENT FOR THE NURSING PROFESSIONAL:

Cardiovascular System

- Apply subjective assessment skills.
- Apply objective assessment skills.
- Use clinical judgment.
- Integrate health promotion interventions into actions.
- Integrate an inclusive approach to cardiovascular assessment.

05: INTRODUCTION TO HEALTH ASSESSMENT FOR THE NURSING PROFESSIONAL:

Gastrointestinal System

- Integrate health promotion interventions into actions.
- Apply subjective assessment skills.
- Apply objective assessment skills.
- Use clinical judgment.

Medical Terminology

Do not use.

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the nervous system
- Identify meanings of key word components of the nervous system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the nervous system
- Use terms related to the nervous system
- Use terms related to the diseases and disorders of the nervous system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the endocrine system
- Identify meanings of key word components of the endocrine system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the endocrine system
- Use terms related to the endocrine system
- Use terms related to the diseases and disorders of the endocrine system
- Use terms related to the diseases and disorders of the endocrine system
- Use terms related to the diseases and disorders of the sensory system
- Use terms related to the sensory system
- Identify the anatomy of the muscular system
- Describe the main functions of the muscular system
- Spell the medical terms of the muscular system and use correct abbreviations
- Explore common diseases, disorders, and procedures related to the muscular system
- Identify the medical specialties associated with the muscular system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the sensory system
- Identify meanings of key word components of the sensory system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the sensory system
- Describe the specialty of obstetrics
- Use terms related to the diseases and disorders of the cardiovascular system
- Spell the medical terms used in obstetrics and use correct abbreviations
- Identify the medical specialties associated with obstetrics
- Explore common complications and procedures related to obstetrics

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the cardiovascular system
- Identify meanings of key word components of the cardiovascular system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the cardiovascular system
- Use terms related to the cardiovascular system
- Identify the common processes in obstetrics
- Use the anatomic reference system to identify the anatomic position of the body
- Use the anatomic reference system to identify the body planes
- Use the anatomic reference system to identify the body cavities
- Use the anatomic reference system to identify the directional terms
- Use the anatomic reference system to identify the divisions of the body
- Describe the structural organization of the body
- Use terms related to the diseases and disorders of the female reproductive system
- Apply the rules of medical language
- Identify meanings of key word components
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the integumentary system
- Identify meanings of key word components of the integumentary system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the integumentary system
- Use terms related to the integumentary system
- Use terms related to the diseases and disorders of the integumentary system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the respiratory system
- Identify meanings of key word components of the respiratory system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the respiratory system
- Use terms related to the respiratory system
- Use terms related to the diseases and disorders of the respiratory system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the urinary system
- Identify meanings of key word components of the urinary system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the urinary system

- Use terms related to the urinary system
- Use terms related to the diseases and disorders of the urinary system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the male reproductive system
- Identify meanings of key word components of the male reproductive system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the male reproductive system
- Use terms related to the male reproductive system
- Use terms related to the diseases and disorders of the male reproductive system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the female reproductive system
- Identify meanings of key word components of the female reproductive system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the female reproductive system
- Use terms related to the female reproductive system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the blood
- Identify meanings of key word components of the blood
- Spell medical terms of the blood vessels and blood and use correct abbreviations
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the blood
- Use terms related to the blood
- Use terms related to the diseases and disorders of the blood
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the lymph and immune systems
- Identify meanings of key word components of the lymph and immune systems
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the lymph and immune systems
- Use terms related to the lymph and immune systems
- Use terms related to the diseases and disorders of the lymph and immune systems
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the digestive system
- Identify meanings of key word components of the digestive system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the digestive system
- Use terms related to the digestive system

- Use terms related to the diseases and disorders of the digestive system
- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the musculoskeletal system
- Identify meanings of key word components of the musculoskeletal system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the musculoskeletal system
- Use terms related to the musculoskeletal system
- Use terms related to the diseases and disorders of the musculoskeletal system

Medical Terminology: 01. Identifying Word Parts in Medical Terms

- Divide medical terms into their component parts (prefix, word root, suffix, combining vowel) and correctly label each part.
- Correctly apply the four combining vowel rules when connecting word parts in medical terms.
- Define medical terms by starting with the suffix meaning and working backwards through the word parts to create accurate literal translations.
- Construct medical terms by correctly arranging word parts and adding appropriate combining vowels when given a definition.
- Distinguish between medical terms that are built from word parts (and can be literally translated) and those that are not built from word parts (such as eponyms, acronyms, and modern language terms).

Medical Terminology: 02. Medical Language Related to the Body as a Whole

- Use the anatomic reference system to identify the body cavities
- Use the anatomic reference system to identify the directional terms
- Use the anatomic reference system to identify the divisions of the body
- Describe the structural organization of the body
- Apply the rules of medical language
- Identify meanings of key word components
- Use the anatomic reference system to identify the anatomic position of the body
- Use the anatomic reference system to identify the body planes

Medical Terminology: 03. Integumentary System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the integumentary system
- Identify meanings of key word components of the integumentary system

- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the integumentary system
- Use terms related to the integumentary system
- Use terms related to the diseases and disorders of the integumentary system

Medical Terminology: 04. Respiratory System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the respiratory system
- Identify meanings of key word components of the respiratory system
- Use terms related to the respiratory system
- Use terms related to the diseases and disorders of the respiratory system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the respiratory system

Medical Terminology: 05. Urinary System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the urinary system
- Identify meanings of key word components of the urinary system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the urinary system
- Use terms related to the urinary system
- Use terms related to the diseases and disorders of the urinary system

Medical Terminology: 06. Male Reproductive System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the male reproductive system
- Identify meanings of key word components of the male reproductive system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the male reproductive system
- Use terms related to the male reproductive system
- Use terms related to the diseases and disorders of the male reproductive system

Medical Terminology: 07. Female Reproductive System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the female reproductive system
- Identify meanings of key word components of the female reproductive system

- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the female reproductive system
- Use terms related to the female reproductive system
- Use terms related to the diseases and disorders of the female reproductive system

Medical Terminology: 08. Obstetrics

- Identify the common processes in obstetrics
- Describe the specialty of obstetrics
- Spell the medical terms used in obstetrics and use correct abbreviations
- Identify the medical specialties associated with obstetrics
- Explore common complications and procedures related to obstetrics

Medical Terminology: 09. Cardiovascular System ☐ Heart

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the cardiovascular system
- Identify meanings of key word components of the cardiovascular system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the cardiovascular system
- Use terms related to the cardiovascular system
- Use terms related to the diseases and disorders of the cardiovascular system

Medical Terminology: 10. Cardiovascular System ☐ Blood Vessels and Blood

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the blood
- Identify meanings of key word components of the blood
- Spell medical terms of the blood vessels and blood and use correct abbreviations
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the blood
- Use terms related to the blood
- Use terms related to the diseases and disorders of the blood

Medical Terminology: 11. Lymphatic and Immune Systems

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the lymph and immune systems
- Identify meanings of key word components of the lymph and immune systems
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the lymph and immune systems
- Use terms related to the lymph and immune systems

- Use terms related to the diseases and disorders of the lymph and immune systems

Medical Terminology: 12. Digestive System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the digestive system
- Identify meanings of key word components of the digestive system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the digestive system
- Use terms related to the digestive system
- Use terms related to the diseases and disorders of the digestive system

Medical Terminology: 13. Skeletal System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the musculoskeletal system
- Identify meanings of key word components of the musculoskeletal system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the musculoskeletal system
- Use terms related to the musculoskeletal system
- Use terms related to the diseases and disorders of the musculoskeletal system

Medical Terminology: 14. Muscular System

- Identify the anatomy of the muscular system
- Describe the main functions of the muscular system
- Spell the medical terms of the muscular system and use correct abbreviations
- Explore common diseases, disorders, and procedures related to the muscular system
- Identify the medical specialties associated with the muscular system

Medical Terminology: 15. Sensory Systems

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the sensory system
- Identify meanings of key word components of the sensory system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the sensory system
- Use terms related to the sensory system
- Use terms related to the diseases and disorders of the sensory system

Medical Terminology: 16. Nervous System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the nervous system
- Identify meanings of key word components of the nervous system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the nervous system
- Use terms related to the nervous system
- Use terms related to the diseases and disorders of the nervous system

Medical Terminology: 17. Endocrine System

- Apply the rules of medical language to build, analyze, spell, pronounce, abbreviate, and define terms as they relate to the endocrine system
- Identify meanings of key word components of the endocrine system
- Categorize diagnostic, therapeutic, procedural or anatomic terms related to the endocrine system
- Use terms related to the endocrine system
- Use terms related to the diseases and disorders of the endocrine system

Nursing Care at The End of Life

Nursing Care and End of Life: : Introduction

- Completion

Nursing Care at The End of Life: Afterwards

- Examine the types of support that can assist individuals to live with their loss.
- Identify the role of the nurse in providing culturally competent care to patients nearing the end of life.
- Examine the basic components of funeral traditions in the United States.
- Describe beliefs and traditions associated with death and dying among various religions and cultures.
- Evaluate one's own attitudes and beliefs about death and dying.
- Describe the writer's perspectives about the realm of nursing care at the end of life using lessons learned from clinical experiences.
- Identify the main factors associated with grief and bereavement in the patient, family, and the nurse.
- Describe the various types of grief and their associated manifestations.

Nursing Care at The End of Life: Anticipation

- Identify various measures used by clinicians for prognostication.
- Describe how clinicians use the benefits and burdens of treatment to assist patients in determination of their goals of care.
- Identify strategies associated with the initiation of end of life conversations.
- Explain various factors associated with patients preferences for care.
- Describe how death and dying has changed in this country over the past few centuries.
- Identify the current top ten causes of death in the United States.
- Explain what end-of-life care is and what it encompasses.
- Identify the role of the nurse in end-of-life care.
- Define illness trajectory.
- Identify the four most common illness trajectories.
- Describe the relationship of illness trajectories to hospice care.
- Explain the importance understanding patterns of illness for individual patients.
- Define what a theory is and explain its relationship to patients with serious illnesses.
- Explain how nurses and clinicians can use theories for their care of patients.
- Describe the premise of quality of life and uncertainty in illness.
- Identify the five stages of grief.
- Describe what death awareness is and its relationship to end-of-life care.
- Define palliative care and hospice care.
- Compare the similarities and differences between hospice and palliative care.
- Identify the advantages and disadvantages between hospice and palliative care.
- Define goals of care in the context of advanced illness.

Nursing Care at The End of Life: In the Moment

- Identify various types of pain and the pharmacological and non-pharmacological interventions used for management.
- Describe components of a comprehensive pain assessment.
- Explain barriers associated with effective pain management.
- Identify the most common non-pain symptoms associated with patients nearing the end of life.
- Describe the interventions used to relieve refractory dyspnea and terminal restlessness in patients nearing the end of life.
- Explore the meaning of hope in the context of death and dying.
- Describe loss and emotional suffering in the patient who is dying.

- Identify common causes of, and interventions for, spiritual distress in patients nearing the end of life.
- Define ethics and the role of ethics in medical decision making.
- Identify basic ethical principles and concepts.
- Examine difficult decisions in end-of-life care.
- To understand the role of the nurse during the dying process and death.
- Describe the phases and associated signs/symptoms involved in the dying process.
- Explain various nursing interventions to facilitate a good death.
- Identify several ways nurses can engage in more effective communication with patients and families.
- Describe some basic communication skills nurses can use to enhance communication.
- Identify several follow-up responses to use with patients.

Nursing Fundamentals

Nursing Fundamentals 05: Safety

- Indicate correct identification of patient prior to performing any patient care measures
- Identify safety considerations for adults of all ages
- Include industry standards and regulations regarding microbiological, physical, and environmental safety
- Apply decision-making related to measures to minimize use of restraints
- Identify evidence-based practices

Nursing Fundamentals 06: Cognitive Impairments

- Identify evidence-based practices in the care of cognitively impaired patients
- Outline resources for patients with a cognitive impairment and their family members or caregivers
- Identify factors related to cognitive impairments across the life span
- Demonstrate respect for the dignity of the patient with a cognitive impairment
- Collect data to identify patients experiencing alterations in cognition
- Include adaptations to the environment to maintain safety for the patient with impaired cognition
- Incorporate nursing strategies to maximize cognitive functioning
- Outline nursing interventions for specific cognitive disorders

Nursing Fundamentals 15: Fluids and Electrolytes

- Identify factors related to fluid/electrolyte balance across the life span
- Assess a patient's nutritional and fluid/electrolyte status
- Outline specific nursing interventions to promote fluid and electrolyte balance
- Base decisions on the signs and symptoms of fluid volume excess and fluid volume deficit
- Base decisions on the interpretation of diagnostic tests and lab values indicative of a disturbance in fluid and electrolyte balance
- Identify evidence-based practices
- Describe variables that influence fluid and electrolyte balance

Nursing Fundamentals Ch 01: Scope of Practice

- Discuss nursing scope of practice and standards of care.
- Compare various settings in which nurses work.
- Describe contributions of interprofessional health care team members.
- Describe levels of nursing education and the NCLEX.
- Discuss basic legal considerations and ethics.
- Outline professional nursing organizations.
- Examine quality and evidence-based practice in nursing.

Nursing Fundamentals Ch 02: Communication

- Document according to legal guidelines.
- Assess one's own communication skills and effectiveness.
- Demonstrate cultural humility, professionalism, and respect when communicating.
- Use communication styles and methods that demonstrate caring, respect, active listening, authenticity, and trust.
- Maintain communication with interprofessional team members and others to facilitate safe transitions and continuity in care delivery.
- Use therapeutic communication techniques.
- Confirm the recipient of the communication heard and understands the message.
- Apply principles of distance and space.
- Discuss strategies for maintaining confidentiality.
- Use technology to access current and reliable information.
- Use correct medical terminology and abbreviations.
- Report significant patient information verbally and in writing.

Nursing Fundamentals Ch 03: Diverse Patients

- Reflect upon personal and cultural values, beliefs, biases, and heritage.
- Embrace diversity, equity, inclusivity, health promotion, and health care for individuals of diverse geographic, cultural, ethnic, racial, gender, and spiritual backgrounds across the life span.
- Demonstrate respect, equity, and empathy in actions and interactions with all health care consumers.
- Participate in life-long learning to understand cultural preferences, worldviews, choices, and decision-making processes of diverse patients.
- Protect patient dignity.
- Demonstrate principles of patient-centered care and cultural humility.
- Make adaptations to patient care to reduce health disparities.
- Adhere to the Patient's Bill of Rights.
- Identify strategies to advocate for patients.
- Use evidence-based practices.

Nursing Fundamentals Ch 04: Nursing Process

- Use the nursing process to provide patient care
- Identify nursing diagnoses from evidence-based sources
- Describe the development of a care plan
- Prioritize patient care
- Describe documentation for each step of the nursing process
- Differentiate between the role of the PN and RN

Nursing Fundamentals Ch 07: Sensory Impairments

- Collect data to identify patients experiencing alterations in sensory perception
- Identify factors related to sensory impairments across the life span
- Demonstrate respect for the dignity of the patient with a sensory impairment
- Detail support for family/significant others caring for patients with a sensory impairment
- Include community resources available for patients and families with a sensory impairment
- Include adaptations to the environment to maintain safety for the patient with a sensory impairment
- Incorporate nursing strategies to maximize sensory perception
- Outline nursing interventions for specific sensory disorders

- Identify evidence-based practices

Nursing Fundamentals Ch 08: Oxygenation

- Assess the patient for objective and subjective manifestations of impaired oxygenation
- Distinguish normal and abnormal assessment data
- Adapt care based on oxygenation assessment data
- Interpret diagnostic tests and lab values indicative of a disturbance in oxygenation
- Identify evidence-based practices

Nursing Fundamentals Ch 09: Infection

- Outline the factors that put patients at risk for infection
- Identify factors related to infection across the life span
- Outline personal practices that reduce the risk of infection transmission
- Base your care decision on the signs and symptoms of infection
- Base your response on an interpretation of the diagnostic tests related to patient's infectious process
- Detail the nursing interventions to support or minimize the physical and psychological effects of the infectious process
- Demonstrate the ability to correlate nursing interventions to methods used to prevent or disrupt the chain of infection
- Follow industry standards for transmission-based precautions
- Identify evidence-based practices

Nursing Fundamentals Ch 10: Integumentary

- Identify the patients at risk for impaired skin integrity
- Identify factors related to alterations in the integumentary system across the life span
- Assess a patient's skin integrity
- Note normal from abnormal findings
- Assess the characteristics of the wound
- Apply correct terminology in the description of wounds
- Adapt care based on integumentary assessment data gathered
- Identify evidence-based practices

Nursing Fundamentals Ch 11: Comfort

- Assess patients for subjective and objective manifestations of alterations in comfort
- Identify factors related to comfort across the life span

- Adhere to standards of care for the patient experiencing pain
- Identify nonpharmacologic measures to minimize pain and discomfort
- Outline the plan for monitoring the patient response to the interventions for pain and discomfort
- Identify evidence-based practices related to assessing pain and providing comfort

Nursing Fundamentals Ch 12: Sleep and Rest

- Assess factors that put patients at risk for problems with sleep
- Identify factors related to sleep/rest across the life span
- Recognize characteristics of sleep deprivation
- Consider the use of nonpharmacological measures to promote sleep and rest
- Identify evidence-based practices

Nursing Fundamentals Ch 13: Mobility

- Assess factors that put patients at risk for problems with mobility
- Identify factors related to mobility across the life span
- Assess the effects of immobility on body systems
- Detail the nursing measures to prevent complications of immobility
- Promote the use of effective techniques of body mechanics among caregivers, patients, and significant others
- Identify evidence-based practices

Nursing Fundamentals Ch 14: Nutrition

- Describe variables that influence nutrition
- Identify factors related to nutrition across the life span
- Assess a patient's nutritional status
- Outline specific nursing interventions to promote nutrition
- Base your decisions on the action of nutrients, signs of excess and deficiency, and specific foods associated with each nutrient
- Base your decisions on the interpretation of diagnostic tests and lab values indicative of a disturbance in nutrition
- Give examples of appropriate vitamin use across the life span
- Identify evidence-based practices related to nutrition

Nursing Fundamentals Ch 16: Elimination

- Assess factors that put a patient at risk for alterations in urinary and bowel elimination
- Identify factors related to alterations in elimination across the life span

- Outline the data that must be collected for identification of alterations in bowel/urine elimination
- Base decisions on the interpretation of basic diagnostic tests of urinary and bowel elimination: urinalysis and occult blood
- Detail the nonpharmacologic measures to promote urinary and bowel elimination
- Identify evidence-based practices

Nursing Fundamentals Ch 17: Grief and Loss

- Advocate for the ethical/legal concerns of the patient and family members making end-of-life decisions
- Identify evidence-based practices associated with end of life care
- Employ nursing measures to support palliative care during the dying process
- Demonstrate respect for the cultural and spiritual beliefs of the patient, caregiver(s), and family members experiencing grief and loss
- Outline available personal and community resources
- Describe nursing responsibilities associated with postmortem care

Nursing Fundamentals Ch 18: Spirituality

- Demonstrate principles of holistic care by incorporating cultural, religious, and spiritual influences on patient health
- Explain the interconnection between spirituality and religious concepts as they relate to health and spiritually sensitive nursing care
- Describe methods to assess the spiritual and religious preferences, strengths, concerns, or distress of clients and plan appropriate nursing care

Nursing Fundamentals Ch 19: Care of the Older Adult

- Consider all aspects of diversity, including age
- Differentiate between normal and abnormal findings for older adults
- Detail specific adaptations in patient care to accommodate the needs of older adults

Nursing Fundamentals Ch. 20: Answer Key

- Completion

Nursing Pharmacology

Nursing Pharmacology 01: Principles of Pharmacology

- Identify and describe the processes of pharmacokinetics

- Apply principles of evidence-based practice to identify pertinent information related to drugs
- Consider pharmacodynamic differences across the lifespan
- Differentiate among prescription drugs, over-the-counter drugs, herbals, and dietary supplements

Nursing Pharmacology 02: Safety and Ethics

- Identify drug administration guidelines for registered nurses in Canada
- Identify nursing responsibilities to prevent and respond to medication errors
- Identify ethical responsibilities as they relate to medication errors
- Explain client-centered care and cultural safety during medication administration
- Outline nursing actions within the scope of nursing practice as they relate to the administration of medication
- Identify nursing responsibilities associated with safe client medication administration and education

Nursing Pharmacology 03: Antimicrobials

- Consider evidence-based concepts when using the nursing process, clinical reasoning and decision-making
- Identify the classifications and actions of antimicrobial medications
- Provide examples of when, how, and to whom antimicrobial drugs may be administered
- Identify the side effects and special considerations associated with antimicrobial therapy
- Explain considerations and implications of using antimicrobial medications across the lifespan

Nursing Pharmacology 04: Autonomic Nervous System Regulation

- Identify the classifications and actions of autonomic nervous system drugs
- Include considerations and implications of using autonomic nervous system drugs across the lifespan
- Include evidence-based concepts when using the nursing process and clinical reasoning related to medications that affect the autonomic nervous system
- Give examples of when, how, and to whom autonomic nervous system drugs may be administered
- Identify the side effects and special considerations associated with autonomic nervous system drugs

Nursing Pharmacology 05: Gas Exchange

- Identify the classifications and actions of respiratory system drugs
- Provide examples of when, how, and to whom respiratory system drugs may be administered
- Identify the side effects and special considerations associated with respiratory system drugs
- Include considerations and implications of using respiratory system drugs across the lifespan
- Include evidence-based concepts when using the nursing process and clinical reasoning related to medications that affect the respiratory system

Nursing Pharmacology 06: Perfusion and Renal Elimination

- Cite the classifications and actions of cardiovascular drugs
- Cite the classifications and actions of renal system drugs
- Give examples of when, how, and to whom cardiovascular system drugs may be administered
- Identify the side effects and special considerations associated with cardiovascular drug therapy
- Identify considerations and implications of using cardiovascular system medications across the life span
- Identify considerations and implications of using renal system medications across the life span
- Apply evidence-based concepts when using the nursing process

Nursing Pharmacology 07: Gastrointestinal Elimination

- Identify the classifications and actions of the gastrointestinal system and elimination drugs
- Consider examples of when, how, and to whom gastrointestinal system drugs may be administered
- Identify the side effects and special considerations associated with gastrointestinal system drug therapy
- Identify considerations and implications of using gastrointestinal system medications across the lifespan
- Consider evidence-based concepts when using the nursing process, clinical reasoning, and decision-making related to medications that affect the gastrointestinal system

Nursing Pharmacology 08: Central Nervous System Regulation, Mood, and Cognition

- Identify the classifications and actions of drugs related to the central nervous system (CNS), mood, and cognition
- Consider examples of when, how, and to whom CNS, mood and cognition drugs may be administered
- Identify the side effects and special considerations associated with CNS, mood, and cognitive therapy
- Identify considerations and implications of using CNS, mood, and cognitive medications across the lifespan
- Consider evidence-based concepts when using the nursing process, clinical reasoning, and decision-making related to medications that affect the CNS, mood, and cognition.

Nursing Pharmacology 09: Endocrine

- Explain the importance of personal hygiene and grooming to mental and physical health
- Define the fundamental elements of personal hygiene and grooming

Nursing Pharmacology 10: Pain and Mobility

- Identify the classifications and actions of medications related to pain and mobility
- Consider examples of when, how, and to whom pain and mobility medications may be administered
- Identify the side effects and special considerations associated with pain and mobility medication therapy
- Identify considerations and implications of using pain and mobility-related medications across the lifespan
- Consider evidence-based concepts when using the nursing process, clinical reasoning, and decision-making related to medications for pain and mobility
- Consider the impact of opioid analgesics on the overdose crisis and the responsibility of the nurse for client education, naloxone administration, and pain management advocacy

Nursing Skills

Nursing Skills: 00: Introduction

- Completion

Nursing Skills: 01: Chapter 1 General Survey

- Document actions and observations.

- Perform a general survey assessment, including vital signs, ability to communicate, appropriateness of behaviors and responses, general mobility, and basic nutritional and fluid status.
- Modify assessment techniques to reflect variations across the life span, cultural values and beliefs, and gender expression.
- Recognize and report significant deviations from norms.

Nursing Skills: 02: Chapter 2 Health History

- Establish a therapeutic nurse-patient relationship.
- Modify assessment techniques to reflect variations across the life span and cultural variations.
- Collect health history data.
- Use effective verbal and nonverbal communication techniques.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 03: Chapter 3 Blood Pressure

- Accurately measure and document blood pressure using American Heart Association standards.
- Adapt the procedure to reflect variations across the life span.
- Recognize and report significant deviations from blood pressure norms.

Nursing Skills: 04: Chapter 4 Aseptic Technique

- Perform appropriate hand hygiene.
- Use standard precautions.
- Use category-specific, transmission-based precautions.
- Maintain a sterile field and equipment.
- Apply and safely remove sterile gloves and personal protective equipment.
- Dispose of contaminated wastes appropriately.

Nursing Skills: 05: Chapter 5 Math Calculations

- Accurately perform calculations using decimals, fractions, percentages, ratios, and/or proportions.
- Convert between the metric and household systems.
- Use military time.
- Use dimensional analysis.

- Accurately solve calculations related to conversions, dosages, liquid concentrations, reconstituted medications, weight-based medications, and intravenous infusions and evaluate final answer to ensure safe medication administration.

Nursing Skills: 06: Chapter 6 Neurological Assessment

- Perform a neurological assessment, including mental status, cranial nerves, sensory function, motor strength, cerebellar function, and reflexes.
- Modify assessment techniques to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 07: Chapter 7 Head and Neck Assessment

- Perform a head and neck assessment, including the skull, face, nose, oral cavity, and neck.
- Modify assessment techniques to reflect variations across the life span.
- Recognize and report significant deviations from norms.
- Document actions and observations.

Nursing Skills: 08: Chapter 8 Eye and Ear Assessment

- Perform an eye and ear assessment, including visual acuity, extraocular motion, and hearing acuity.
- Modify assessment techniques to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 09: Chapter 9 Cardiovascular Assessment

- Perform a cardiovascular assessment, including heart sounds; apical and peripheral pulses for rate, rhythm, and amplitude; and skin perfusion (color, temperature, sensation, and capillary refill time).
- Identify S1 and S2 heart sounds.
- Differentiate between normal and abnormal heart sounds.
- Modify assessment techniques to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 10: Chapter 10 Respiratory Assessment

- Perform a respiratory assessment.

- Differentiate between normal and abnormal lung sounds.
- Modify assessment techniques to reflect variations across the life span.
- Document actions and observations.
- Recognize and report deviations from norms.

Nursing Skills: 11: Chapter 11 Oxygen Therapy

- Implement interventions to improve a patient's oxygenation status.
- Correctly apply oxygen equipment.
- Set flow rate using fixed and portable equipment.
- Survey the environment for potential safety hazards.
- Use pulse oximetry.
- Assess patient response to oxygen therapy.
- Adapt procedures to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 12: Chapter 12 Abdominal Assessment

- Differentiate normal and abnormal bowel sounds.
- Modify assessment techniques to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.
- Perform an abdominal assessment.

Nursing Skills: 13: Chapter 13 Musculoskeletal Assessment

- Recognize and report significant deviations from norms.
- Document actions and observations.
- Perform a musculoskeletal assessment.
- Palpate joints for pain, swelling, change in temperature, and range of motion.
- Modify assessment techniques to reflect variations across the life span.

Nursing Skills: 14: Chapter 14 Integumentary Assessment

- Perform an integumentary assessment including the skin, hair, and nails.
- Modify assessment techniques to reflect variations across the life span and ethnic and cultural variations.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 15: Chapter 15 Administration of Enteral Medications

- Safely administer medication orally, rectally, and via enteral tubes.
- Accurately check medication administration rights three times.
- Calculate correct amount of medication to administer.
- Explain medication information to patient.
- Collect appropriate assessment data prior to and after medication administration.
- Modify procedure to reflect variations across the life span.
- Document actions and observations.

Nursing Skills: 16: Chapter 16 Administration of Medications Via Other Routes

- Safely administer medications and irrigations for the eye, ear, inhalation, and vaginal routes.
- Select the appropriate equipment.
- Calculate correct amount to administer.
- Select appropriate site.
- Modify the procedure to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 17: Chapter 17 Enteral Tube Management

- Administer enteral nutrition.
- Perform irrigation and suctioning of enteral tubes.
- Select appropriate equipment.
- Explain the procedure to the patient.
- Assess tube placement.
- Implement measures to prevent displacement of tube.
- Modify procedures to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 18: Chapter 18 Administration of Parenteral Medications

- Safely administer medication via the intradermal, subcutaneous, and intramuscular routes.
- Maintain aseptic technique.
- Select appropriate equipment.
- Calculate correct amount of medication to administer.

- Correctly select site using anatomical landmarks.
- Modify procedure to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 19: Chapter 19 Specimen Collection

- Maintain standard and transmission-based precautions.
- Select appropriate equipment.
- Accurately collect specimens for blood glucose monitoring, nasal swabs, and oropharyngeal swabs.
- Modify procedure to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.
- Explain procedure to patient.

Nursing Skills: 20: Chapter 20 Wound Care

- Assess tissue condition, wounds, drainage, and pressure injuries.
- Cleanse and irrigate wounds.
- Apply a variety of wound dressings.
- Obtain a wound culture specimen.
- Use appropriate aseptic or sterile technique.
- Explain procedure to patient.
- Adapt procedures to reflect variations across the life span.
- Recognize and report significant deviations in wounds.
- Document actions and observations.

Nursing Skills: 21: Chapter 21 Facilitation of Elimination

- Perform urinary catheterization, ostomy care, and urine specimen collection.
- Manage urinary catheters to prevent complications.
- Maintain aseptic or sterile technique.
- Explain procedure to patient.
- Modify assessment techniques to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 22: Chapter 22 Tracheostomy Care & Suctioning

- Safely perform nasal, oral, pharyngeal, and tracheostomy suctioning.
- Provide tracheostomy care.
- Explain procedure to patient.
- Adapt procedure to reflect variations across the life span.
- Document actions and observations.
- Recognize and report significant deviations from norms.

Nursing Skills: 23: Chapter 23 IV Therapy Management

- Prepare and safely administer primary and secondary IV fluids and medication.
- Calculate and ensure designated flow rate.
- Change IV tubing.
- Change IV site dressing.
- Inspect established IV site for deviations from normal.
- Discontinue short-term peripheral IV.
- Modify the procedure to reflect variations across the life span.
- Document actions and observation.
- Report significant deviations from norms.

Nursing Skills: 24: Answer Keys

- Completion

Nutrition Essentials

HLTH 09: Nutrition Essentials: CH06.00: Chapter 6: Protein

- Explain the ways to determine protein quality.
- Describe the various types of vegetarianism and strategies for vegetarians to consume adequate protein.
- Differentiate between a food allergy and a food intolerance and list top food allergens.
- Describe protein synthesis and the health consequences of protein imbalance.
- Calculate your recommended protein intake using the RDA for protein and the AMDR.
- Describe the roles, structure, and functions of proteins.
- Explain the process of denaturation and its consequences.
- Describe how proteins are digested and absorbed by our bodies.

HLTH 09: Nutrition Essentials: CH08.00: Chapter 8: Alcohol

- Discuss how alcohol is made and consumed.

- Describe the absorption and metabolism of alcohol in the body.
- List the symptoms of intoxication and how blood alcohol content can be influenced.
- Describe the health consequences of alcohol use and abuse.
- List symptoms of Alcohol Use Disorder.

HLTH 09: Nutrition Essentials: CH09.00: Chapter 9: Energy Balance

- Define hyperplasia vs hypertrophy of adipose tissue and their implications for weight loss or gain.
- Describe the prevalence of obesity in the US and obesogenic environments.
- Be able to calculate and categorize body mass index (BMI) given a particular weight and height and discuss the limitations of using BMI.
- Name the methods of assessment and factors that affect body composition and body fat distribution and how these relate to overall health.
- Discuss energy balance and be able to calculate your estimated energy requirements (EER).
- Summarize the factors involved in today daily energy expenditure (TDEE) and the factors affecting basal metabolic rate (BMR).
- Summarize factors affecting energy intake and energy expenditure.
- Describe health risks associated with being overweight or obese.
- Explain the characteristics of successful weight management.
- Differentiate among the various forms of weight loss surgery.

HLTH 09: Nutrition Essentials: CH10.00: Chapter 10: Disordered Eating

- Describe the role of body image and other risk factors in the development of disordered eating.
- Identify disordered eating behaviors.
- Differentiate among the characteristics of the most common eating disorders.
- Describe health risks associated with eating disorders and/or being underweight.
- Describe eating disorder treatment including goals.

HLTH 09: Nutrition Essentials: CH11.00: Chapter 11: Food Insecurity and Food Waste

- Define food security and food insecurity including the various levels of insecurity.
- Describe who is affected by food insecurity in the US and the world and why.
- Define food deserts and food swamps.
- Differentiate among programs in the US that address food insecurity.
- Describe the problem of food waste and interventions for its reduction.

HLTH 09: Nutrition Essentials: CH12.00: Chapter 12: Nutrition and Fitness

- Define physical fitness, physical activity, exercise, and other terms related to fitness.
- Describe the components of fitness and how they relate to overall health.
- Describe the physical activity guidelines and provide examples of how to reach them.
- Explain physical training principles.
- Explain how the body fuels physical activity.
- Describe how physical activity influences dietary requirements of macro- and micronutrients.
- Discuss special considerations for athletes such as glycogen supercompensation, anemia, RED-s Syndrome, fluids, caffeine, and weight management.

HLTH 09: Nutrition Essentials: CH15.00: Chapter 15: Key Functions of Micronutrients

- Describe the roles of micronutrients associated with energy metabolism.
- List common food sources for each micronutrient associated with energy metabolism, names of deficiency/toxicity conditions and their respective consequences.
- Describe the role of electrolytes in fluid balance, as well as the more specific functions, food sources, and effects of deficiency/toxicity for sodium, potassium, and chloride.

HLTH 09: Nutrition Essentials: CH16.00: Chapter 16: Key Functions of Micronutrients

- Describe the functions of calcium in the body, how calcium homeostasis is regulated, food sources of calcium, and effects of calcium deficiency and toxicity.
- Describe the synthesis, metabolism, and functions of vitamin D, as well as food sources and effects of deficiency and toxicity of vitamin D.
- Briefly describe the functions of phosphorus, magnesium, and fluoride in bone health and beyond, their food sources, and effects of deficiency and toxicity.
- Define osteoporosis, identify risk factors for development, and explain how osteoporosis can be prevented.
- Describe the role of blood, as well as the more specific functions, food sources, and effects of deficiency and toxicity for iron and vitamin K.
- Describe how free radicals develop and the role of antioxidants in fighting oxidative stress.
- Describe the general function of antioxidants, as well as the more specific functions, food sources, and effects of deficiency and toxicity for vitamin E, vitamin C, and selenium.
- Describe how vitamin A and beta-carotene contribute to normal vision, and know common food sources and effects of deficiency and toxicity of vitamin A.

HLTH 09: Nutrition Essentials: CH01.00: Chapter 1: Introduction to Nutrition

- Define health, nutrition, and disease
- List and describe the characteristics used to assess health status of an individual.
- Explain the difference between primary and secondary nutrient deficiency.
- Differentiate among risk factors, signs, and symptoms.
- Define the word "nutrient" and differentiate among the six classes of nutrients essential for health.
- Explain how energy values of food are determined, and list the three energy-yielding nutrients and their energy contribution.
- Describe measures of food quality and be able to calculate and compare energy densities of foods.
- Describe the importance of research and scientific methods to understanding nutrition.
- Analyze sources of nutrition information for reliability and credibility.

HLTH 09: Nutrition Essentials: CH02.00: Chapter 2: Choosing Foods Wisely

- Describe the action steps of the 2020-2025 Dietary Guidelines for Americans and ChooseMyPlate.
- Estimate your daily energy requirement and calculate Acceptable Macronutrient Distribution Ranges (AMDRs).
- Describe factors that affect food choices.
- Identify factors to consider when developing a healthy diet.
- Describe the current state of the American diet.
- Assess portion sizes of foods.
- Use the Nutrition Facts Label (NFL) to evaluate the nutritional information of food.
- Describe the types of claims allowed on food packaging and be able to categorize claims.

HLTH 09: Nutrition Essentials: CH03.00: Chapter 3: Food Safety

- Describe the major types and causes of foodborne illness and contamination.
- Identify groups that are at higher risk for foodborne illness.
- Describe the process government officials use to track foodborne illness.
- Explain the ways food manufacturers reduce the risk of foodborne illness.
- Describe the consumer level techniques for avoiding foodborne illness.

HLTH 09: Nutrition Essentials: CH04.00: Chapter 4: Human Digestion

- Differentiate between mechanical and chemical digestion and describe digestive activities in each category.
- Identify the anatomy of the digestive system and its secretions that aid digestion.
- Explain the functional physiology of the digestive system organs and their secretions.
- Describe how foods and nutrients are digested, absorbed, and transported, and stored.
- Describe digestive disorders that can compromise health including risk factors, symptoms, treatment, and prevention.

HLTH 09: Nutrition Essentials: CH05.00: Chapter 5: Carbohydrates

- Describe the different types of simple and complex carbohydrates.
- Discuss how carbohydrates are digested and absorbed in the human body.
- Summarize how blood glucose is regulated and what happens when glucose levels are not ideal.
- Describe the functions of carbohydrates in the body.
- Discuss the recommended types, amounts, and sources of carbohydrates in the diet including the AMDR, AI for fiber, and amount of added sugars.
- Describe the types, benefits, and risks of sugar alternatives.
- Summarize the long-term health implications and the dietary approaches to living with type 1 and type 2 diabetes and lactose intolerance.

HLTH 09: Nutrition Essentials: CH07.00: Chapter 7: Lipids

- Explain the structures of lipids (triglycerides, phospholipids, sterols) and how structure impacts its function as it relates to health and disease.
- Compare and contrast the structure of the following types of fats: triglycerides (saturated, monounsaturated, polyunsaturated, omega-3, and omega-6), phospholipids, and sterols
- Summarize the steps in lipid digestion, absorption, and transport through the body.
- Explain how lipids are used for energy and stored in the body.
- Discuss health issues related to lipids, including risk factors and signs/symptoms.

HLTH 09: Nutrition Essentials: CH13.00: Chapter 13: Water

- Describe how body water is distributed
- Describe the major aspects and organs involved in water regulation in the body.
- Explain the functions of water in the body.

- Discuss daily water gains and water losses including how the thirst mechanism works in the body.
- Discuss the consequences of too much or too little water.
- Describe how water is safe to drink and the pros and cons of bottled water.

HLTH 09: Nutrition Essentials: CH14.00: Chapter 14: Micronutrients Overview

- Define bioavailability and list characteristics that affect the bioavailability of micronutrients.
- Discuss the effects of processing on the nutrient content of foods.
- Identify nutrient dense food sources of micronutrients and differentiate between fortified and enriched foods.
- Describe the characteristics of fat- and water-soluble vitamins.
- Describe the characteristics of minerals and how they are classified in nutrition.
- Define each of the Dietary Reference Intakes (DRIs), explain how they are developed, and how they can be used to promote healthy diets.

HLTH 09: Nutrition Essentials: CH17.00: Chapter 17: Dietary Supplements

- Define a dietary supplement and describe a typical user.
- Define ergogenics and provide possible mechanisms of action.
- Describe how dietary supplements are regulated in the US.
- Differentiate among the claims allowed on dietary supplements by FDA and the labeling requirements.
- Describe recommendations for choosing dietary supplements wisely.

HLTH 09: Nutrition Essentials: CH18.00: Chapter 18: Nutrition Through the Lifecycle

- Summarize prenatal nutritional requirements and dietary recommendations.
- Discuss the most important nutritional concerns during pregnancy.
- Discuss the benefits and barriers related to breastfeeding.
- Examine feeding problems that parents and caregivers may face with their infants.
- Explore the introduction of solid foods into a toddler's diet.
- Discuss the most important nutrition-related concerns during childhood.
- Discuss the most important nutrition-related concerns during adolescence.
- Discuss the most important nutrition-related concerns during middle and old age.
- Explain how nutritional and lifestyle choices can affect current and future health

Nutrition Through the Life Cycle

Nutrition Through the Life Cycle: 1. If Your Goal Is Becoming a Centenarian Dodge Chronic Diseases

- Understand the prevalence and risk factors of hypertension
- Explain the physiological mechanisms of blood pressure regulation
- Recognize the progression and complications of hypertension
- Evaluate lifestyle interventions for hypertension
- Understand the development and risk factors of cardiovascular disease
- Explain the pathophysiology of atherosclerosis.
- Evaluate lifestyle interventions for cardiovascular disease prevention and management.
- Recognize the limitations of current interventions for advanced atherosclerosis.
- Understand the challenges of weight loss and maintenance.
- Evaluate the role of bariatric surgery in weight management.
- Explore the importance of lifestyle interventions.
- Prioritize obesity prevention.
- Recognize and address implicit weight bias
- Explore the consequences of weight stigma and discrimination
- Examine weight bias in healthcare
- Explain the physiological changes that take place when a person becomes overweight or obese.
- Connect the physiological changes triggered by obesity to type 2 diabetes, hypertension and cardiovascular disease
- Understand how type 2 diabetes, hypertension and cardiovascular disease develop
- Describe lifestyle choice to reduce the risk for chronic diseases
- Understand the complex nature of obesity
- Explore the role of adipose tissue as an endocrine organ
- Examine the link between obesity and systemic chronic inflammation (SCI)
- Differentiate between metabolically healthy and unhealthy obesity
- Understand the complexities of healthy weight
- Explore the pathophysiology of T2D
- Recognize the complications of T2D
- Evaluate lifestyle interventions for T2D prevention and management
- Consider surgical interventions for T2D
- Understand the global prevalence and risk factors of T2D

Nutrition Through the Life Cycle: 2. A Healthy Life Starts Earlier Than You Think: Pre-Conception And Pregnancy

- Describe how dietary factors can modify the epigenome.
- Explain how epigenetic changes can be passed down to future generations.
- Discuss the impact of underweight, obesity, and inflammation on fertility.
- Identify key nutrients (folate, iron, vitamin B12) essential for optimal fertility.
- Describe the role of hormones in pregnancy adaptations.
- Explain the role of the placenta in nutrient and gas exchange between mother and fetus.
- Describe the changes in the cardiovascular, respiratory, renal, and metabolic systems during pregnancy.
- Identify the increased nutrient needs during pregnancy, especially for energy, protein, and micronutrients.
- Explain the importance of appropriate weight gain during pregnancy and its impact on maternal and fetal health.
- Discuss general dietary guidelines, including food safety practices and nutrient-dense food choices.
- Identify common discomforts like nausea, vomiting, heartburn, and constipation and strategies to manage them.
- Discuss the risks associated with alcohol, caffeine, and other substances during pregnancy.
- Identify the increased nutrient needs for breastfeeding mothers.
- Discuss strategies for healthy weight loss postpartum.
- Discuss the benefits of breastfeeding and formula feeding.
- Explain the nutritional needs of infants and toddlers.
- Discuss picky eating, food allergies, and strategies for healthy eating in toddlers.
- Discuss the importance of a balanced diet, physical activity, and healthy weight management in children and adolescents.
- Discuss the prevalence, risk factors, and prevention of eating disorders in adolescents.
- Define epigenetics and explain how it influences gene expression.

Nutrition Through the Life Cycle: 3. Setting Up a Healthy Metabolism: Infancy to Preschool

- Understand the importance of growth monitoring and the factors influencing infant growth.

- Explain the physiological processes underlying breastfeeding and formula feeding, including hormonal regulation and infant reflexes.
- Describe the nutritional composition and benefits of human milk and formula, as well as the potential challenges and considerations associated with each.
- Understand the principles of introducing solid foods, including timing, appropriate food choices, and responsive feeding practices.
- Explain the role of the gut microbiome in infant health and immune development, and the factors that influence its composition.
- Discuss the development of taste preferences in infants and children, and strategies to promote healthy eating habits.
- Identify common dietary challenges and nutritional concerns in infants and young children.
- Understand the importance of early life nutrition in shaping long-term health outcomes.
- Recognize the impact of cultural and socioeconomic factors on infant and child feeding practices.
- Appreciate the complexity of the infant feeding experience and the importance of individualized approaches.

Nutrition Through the Life Cycle: 4. Developing Healthy Eating Habits: Pre-Adolescence And Adolescence

- Understand the concept of adiposity rebound and its impact on long-term health.
- Explain the factors influencing the timing of puberty onset, including the role of body fat and hormones.
- Define food security and its impact on individuals and families, particularly on children's health and development.
- Analyze the role of social influence, including peer and parental influence, on the development of body image and eating behaviors.
- Discuss the impact of hormonal changes during puberty on brain development, behavior, and body image.
- Identify the risk factors for eating disorders in adolescents and the importance of prevention.
- Understand the unique nutritional needs of teen athletes and the limitations of current research.
- Apply the principles of the Athlete Performance Plates to create a balanced diet for teen athletes.
- Evaluate the effectiveness of trendy diets and supplements for teen athletes.

- Explore the psychological models of social influence, such as behaviorism and social learning theory, on body image and eating behaviors.

Nutrition Through the Life Cycle: 5. Living a Long And Healthy Life: Adulthood And Old Age

- Define key terms related to aging, adulthood, and old age.
- Explain the aging process and its underlying mechanisms, including cellular and physiological changes.
- Identify factors that influence the rate of aging, such as genetics and lifestyle.
- Understand the impact of ageism on health and well-being, including its manifestations and consequences.
- Discuss the importance of nutrition in promoting healthy aging, particularly for older adults.
- Recognize the challenges associated with maintaining body composition and preventing malnutrition in older adults.
- Explore strategies for preventing and managing frailty, including diet and exercise.
- Assess nutritional status in older adults using tools like the Mini-Nutritional Assessment.
- Identify interventions to reduce ageism and improve the quality of life for older adults.
- Understand the role of cognitive health in preventing malnutrition and promoting overall well-being in older adults.

Nutrition Through the Life Cycle: 6. Activity Resources

- Understand the role of the Dietary Guidelines for Americans (DGAs) in US food policy and nutrition recommendations.
- Identify key recommended eating patterns based on the DGAs, including the Healthy American Eating Pattern (MyPlate and DASH), the Healthy Mediterranean Eating Pattern, and the Healthy Vegetarian Eating Pattern.
- Evaluate the short-term benefits and long-term risks of the Paleo Diet.
- Understand the specific conditions for which the Ketogenic Diet may be appropriate and recognize its limitations as a long-term, daily eating pattern.
- Identify the potential drawbacks of Western-style low-fat diets, such as increased intake of sugar and refined carbohydrates.
- Recognize the potential for nutrient deficiencies with low-carb diets and discuss the lack of long-term studies on their safety.
- Explain the challenges of adhering to diets that deviate significantly from cultural eating patterns and discuss the potential for yo-yo dieting with restrictive diets.

Nutrition Through the Life Cycle: 7. Nutrition Basics

- Define energy balance and its three states.
- Identify the components of energy expenditure (BMR, physical activity, TEF, and cold-induced thermogenesis).
- Discuss health disparities related to energy balance.
- Explain the limitations of BMI as a health measure.
- Describe the components of body composition (fat mass, fat-free mass, lean body mass, and body fat distribution).
- Discuss methods for determining body fat percentage.
- Explain the physiological regulation of energy balance.
- Describe metabolic adaptations during weight loss.
- Discuss strategies for successful weight loss maintenance.
- Define orthorexia and its potential negative impacts.

Personal Care Assistant

HLTH 06: 01: Personal Care Assistant: Chapter 1

- Identify types of PPE and their uses
- Explain proper donning and doffing of PPE
- Describe respiratory hygiene
- Identify proper procedures when assisting with feeding, handling soiled laundry, and disposing of waste
- Differentiate between the three levels of decontamination: cleaning, disinfecting and sterilizing
- Identify the signage and the appropriate PPE for each isolation precaution
- Identify common infections and which infections require isolation techniques
- Define the precautions for Contact, Droplet and Airborne Isolation protocol
- Implement isolation and special barrier precautions
- Explain what a germ (microbe) is, and use proper terminology when discussing infectious diseases
- Explain how microbes are transmitted
- Explain the difference between clean and contaminated in the medical field
- Explain what is meant by Infection Control Practices
- Explain Healthcare Acquired Infections and Multi Drug Resistant Organisms
- Describe the chain of infection
- Describe the modes of transmission

- Recognize signs and symptoms of Infection

HLTH 06: 02: Personal Care Assistant: Chapter 2

- Define the care team and the roles of each member
- Identify professional behaviours for medical personnel
- Identify different methods of understanding and the communication process
- Differentiate between verbal and non-verbal communication

HLTH 06: 03: Personal Care Assistant: Chapter 3

- Measure health across multiple dimensions
- Discuss the functions and parts of the major body systems
- Link illnesses to a specific body system
- Identify several common illnesses and how to spot them
- Apply a checklist to identify key changes in clients' health

HLTH 06: 04: Personal Care Assistant: Chapter 4

- Demonstrate principles of good body mechanics when lifting, transferring and providing patient care

HLTH 06: 05: Personal Care Assistant: Chapter 5

- Explain the importance of personal hygiene and grooming to mental and physical health
- Define the fundamental elements of personal hygiene and grooming

HLTH 06: 06: Personal Care Assistant: Chapter 6

- Identify the body parts that are involved in eating
- Explain the importance of a balanced diet for clients' information
- Explain how nutrient needs change dependent on life changes
- Demonstrate safe food handling practices with considerations of clients' specific needs and limitations

The Basics of Health, Wellness, and Fitness

The Basics of Health, Wellness, and Fitness: 09 Stress, Self Care, and Sleep

- Define stress
- Understand the difference between eustress and distress
- Understand the difference between acute and chronic stress
- Explain ways to deal with stress
- Explain what self-care is and what it can look like

- Understand the importance of sleep
- Explain how circadian rhythms influence sleep
- Explain how homeostatic sleep drive influences sleep

The Basics of Health, Wellness, and Fitness: 01 Health and Wellness

- Define health
- Define wellness
- Distinguish between health and wellness
- Explain the dimensions of wellness
- Explain the difference between controllable and uncontrollable health factors
- Explain what “health disparities” means
- Define the phrase “social determinants of health.”
- Identify the five categories that the social determinants of health can be broken into

The Basics of Health, Wellness, and Fitness: 02 Behavior Change

- Explain the concept of locus of control
- Explain the Stages of Change Model (Transtheoretical Model) and how it would apply to physical activity
- Understand the benefits of the SMART goal design
- Develop their own SMART goal
- Define self-efficacy

The Basics of Health, Wellness, and Fitness: 03 Physical Activity, Exercise, and Fitness

- Define physical activity
- Understand the benefits of physical activity
- Define exercise
- Be able to explain the difference between physical activity and exercise
- Understand how much physical activity/ exercise is recommended.
- Define fitness
- Identify and define the 5 health-related components of fitness
- Identify and define the 6 skill-related components of fitness

The Basics of Health, Wellness, and Fitness: 04 Nutrition

- Define nutrients
- Explain the difference between essential and non-essential nutrients
- Understand what a calorie is (and what it isn’t)

- List and give examples of each macronutrient
- List and give examples of each micronutrient

The Basics of Health, Wellness, and Fitness: 05 Cardiovascular Endurance

- Define cardiovascular endurance
- Understand how oxygen is transported
- Define heart rate and understand ranges
- Understand and be able to calculate target HR
- Define blood pressure and understand ranges.
- Explain basic changes that happen to the cardiovascular system with exercise.
- Understand the importance of cardiovascular endurance
- Assess their own muscular endurance and strength

The Basics of Health, Wellness, and Fitness: 06 Muscular Strength And Endurance

- Define muscular endurance
- Define muscular strength
- Understand the differences between training for muscular strength and endurance
- Explain the importance of participation in resistance training
- Assess their own muscular endurance and strength

The Basics of Health, Wellness, and Fitness: 07 Flexibility

- Define flexibility
- Understand the importance of flexibility
- Define range of motion
- Explain the importance of flexibility
- Identify different types of stretches
- Assess their own flexibility

The Basics of Health, Wellness, and Fitness: 08 Body Composition

- Define body composition
- Explain why body fat is a better indicator of health than body weight
- Understand the difference between fat mass and fat-free mass
- Understand the limitations of BMI
- Explain why there is a recommended range for "ideal" body composition
- Identify ways to measure body composition

- Understand that body composition is only a single factor and does not give us a full picture of one's health, wellness, or activity level

Pointful Education

Career Exploration in Healthcare

Module 00: Career Exploration in Healthcare

- Completion

Module 01: Timeline of Healthcare Careers

- Construct the timeline of health care careers.
- Identify prominent historical figures in Health Care.
- Describe the progression of health care in the United States.
- Discuss how robotics will change the future of Health Care.
- Discuss the impact that artificial intelligence will have on the future of Health Care.

Module 02: The Physician and the Physician's Assistant

- Describe the roles of the Physician's Assistant and the Physician including key responsibilities and education requirements.
- Define "Quality Healthcare" within the role of the Physician and the Physician's Assistant.
- Compare and contrast the physical, ethical, and legal responsibilities of the Physician and the Physician's Assistant.
- Identify current insurance types in the United States.
- Analyze the impact of insurance to the Health Care industry.
- Analyze the HIPPA law as it applies to health care professionals.

Module 03: The Pharmacist

- Identify the physical responsibilities of the Pharmacist.
- Evaluate pharmaceutical specialties.
- Compare the ethical and legal responsibilities of the Pharmacist with the prescribing physician.
- Discuss the future of Pharmacy as it relates to the growing and changing drug industry within the United States.
- Describe the roles of the Pharmacist including key responsibilities and education requirements.
- Define "Quality Healthcare" within the role of the Pharmacist.

Module 04: The Physical Therapist

- Describe the roles of the Physical Therapist and Physical Therapy Assistant, including key responsibilities and education requirements.
- Define “Quality Healthcare” within the role of the Physical Therapist.
- Identify the physical responsibilities of the Physical Therapist.
- Analyze the ethical and legal responsibilities of the Physical Therapist.
- Discuss technological advancements which have impacted the future of Physical Therapy.

Module 05: The Healthcare Information Technology Manager

- Outline the history of technology in medicine and healthcare.
- Describe the challenges of record-keeping and cybersecurity within healthcare.
- Evaluate the roles of the Healthcare IT Manager including key responsibilities and education requirements. I
- Identify the physical responsibilities of the Healthcare IT Manager.
- Recognize various electronic medical record software systems.
- Analyze the ethical and legal responsibilities of the Healthcare IT Manager.
- Identify the future impact to the role of the Nurse with the introduction of a Healthcare IT Manager.

Module 06: The Occupational Therapist

- Describe the roles of the Occupational Therapist including key responsibilities and education requirements.
- Define “Quality Healthcare” within the role of Occupational Therapist.
- Identify the physical responsibilities of the Occupational Therapist.
- Analyze the ethical and legal responsibilities of the Occupational Therapist.
- Identify the future impact to the role of the Occupational Therapist with the introduction of new and emerging technology.

Module 07: The Technician

- Describe the roles of the Technician including key responsibilities and education requirements.
- Define “Quality Healthcare” within the roles of the Technician.
- Identify the physical responsibilities of the Technician.
- Analyze the ethical and legal responsibilities of the Technician.

- Identify the future impact to the role of the Physician with the introduction of the Technician.

Module 08: The Dentist

- Define "Quality Healthcare" within the role of the Dentist.
- Identify the physical responsibilities of the Dentist.
- Analyze the ethical and legal responsibilities of the Dentist.
- Identify the future impact to the role of the Dentist with the introduction of new and emerging technologies.
- Describe the role of the Dentist including key responsibilities and education requirements.

Module 09: The Paramedic

- Describe the role of the Paramedic including key responsibilities and education requirements.
- Define "Quality Healthcare" within the role of the Paramedic.
- Identify the physical responsibilities of the Paramedic.
- Analyze the ethical and legal responsibilities of the Paramedic.
- Identify the factors that will lead to the growth of the Paramedic profession.

Module 10: The Nurse

- Describe the role of the Nurse including key responsibilities and education requirements.
- Define "Quality Healthcare" within the role of the Nurse.
- Identify the physical responsibilities of the Nurse.
- Analyze the ethical and legal responsibilities of the Nurse.
- Describe the impact to the role of the Nurse with new and emerging technology.

Module 11: Final Exam

- Completion

Healthcare Management and Information Systems

HMIS 00: Start Here

- Completion

HMIS 01: Healthcare

- Recognize basic characteristics, interrelationships and services of different types of healthcare organizations (e.g., hospitals, clinics, physician practices, ambulatory centers, community health organizations, and urgent care.)
- Identify the types of inpatient and outpatient healthcare services.
- Demonstrate knowledge of the various healthcare services provided at the federal level.
- Determine the various positions and departments within healthcare organizations.
- Explore healthcare regulations and financing.

HMIS 02: Technology

- Recognize trends in healthcare technology (e.g., telemedicine, patient portals, wearable devices, 3D printing)
- Identify cost and quality-of-care concerns that drive Health IT use.
- Describe the computer software used in Health IT.
- Analyze the evolution of electronic Health Record Applications.
- Evaluate the trends affecting Health IT, IT Infrastructure, and the use of applications.

HMIS 03: Clinical Informatics

- Identify and support opportunities to optimize clinical effectiveness and efficiencies
- Understand various data visualization techniques (e.g., tables, graphs, charts)
- Maintain clinical content and decision-support tools
- Identify basic clinical vocabulary/terms frequently represented in healthcare informatics (e.g., dosage frequency, dosage routes, body systems)
- Identify basic healthcare IT vocabulary/terms frequently represented in healthcare informatics (e.g., LAN, SMS, VPN)
- Identify basic clinical metrics frequently represented in informatics

HMIS 04: The Systems Development Life Cycle Part I

- Explore the Systems Development Life Cycle.
- Conduct basic analysis and interpretation including Requests for Information, Requests for Proposals, and Non-Disclosure Agreements.
- Explore design concepts including useability, User-Centered Design, and data organization.
- Evaluate requirement gathering and Project Management Plans.
- Analyze the components of Business Continuity Planning.

HMIS 05: The Systems Development Life Cycle Part II

- Understand the process of successful system selection and EHR certifications
- Identify Interoperability and Data Exchange standards as well as vendor-specific considerations.
- Explore implementation and support systems.
- Analyze the components of testing and evaluation.
- Evaluate the privacy and security considerations for Health IT.

HMIS 06: Communication

- Apply basic speaking and active listening skills with meaningful feedback.
- Apply basic observational skills and related documentation strategies in written and oral form.
- Identify characteristics of successful and unsuccessful communication including barriers.
- Recognize verbal and non-verbal cues.
- Demonstrate written communication including emails using correct spelling, grammar, formatting, and confidentiality.
- Demonstrate ability to create professional correspondence using appropriate email practices and etiquette.

HMIS 07: Management and Leadership Part I

- Understand components of an IT strategic plan (e.g., process maturity and growth, gap analysis, quality improvement, organizational alignment, roles and responsibilities, performance measurement)
- Assess the organizational environment (e.g., corporate culture, values, and drivers)
- Gather and compile metrics to monitor and assess specific organizational performance indicators
- Monitor, assess and report on key performance indicators of systems effectiveness
- Comply with legal and regulatory standards
- Understand and comply with the organization's ethical business principles

HMIS 08: Management and Leadership Part II

- Maintain awareness of emerging industry trends
- Identify and recommend strategies to mitigate organizational risk
- Maintain effective and ethical working relationships with internal and external stakeholders (e.g., clinicians, vendors, partners)

- Identify and provide data to support recommendations for decision-makers
- Understand and support organizational change management processes
- Understand individual and team roles, responsibilities, and job descriptions
- Prepare and deliver business communications (e.g., presentations, reports, project plans)

HMIS 09: Final Exam

- Completion

Hospitality & Tourism

Certify ED

Hospitality Management

Hospitality - Unit 01 - Hospitality Fundamentals

- Define the hospitality industry and explain its main goal.
- Summarize the history and development of the hospitality and tourism industry as well as the changes and growth the tourism industry has experienced, including developments such as airline deregulation, the highway system, and globalization.
- Explain the economic factors surrounding the hospitality and tourism industry, such as fuel costs, airline industry consolidations, politics, exchange rates, availability of consumer's discretionary money, and taxes.
- Identify and describe the different types of travelers and their motivations for travel, such as for business, leisure, and visiting friends and relatives.
- Describe standards of service.
- Identify various career paths and opportunities within the hospitality industry, such as ground transportation, cruise, air travel, accommodations, food service, share economy marketing, retail, corporate travel, leisure and recreation travel, conventions and special events, destination marketing organizations, emerging fields, and sports venues.
- Identify business, professional, student industry associations and available industry certifications.
- Explain the duties and responsibilities for the identified hospitality and tourism positions.

- Describe the function of human resources in the hospitality industry and the skills and knowledge needed by hospitality and tourism professionals.
- Identify requirements for entry and career advancement by industry component in the hospitality and tourism industry.
- Display an understanding of hospitality terminology.
- Identify the organizational structure of various departments, including facilities and engineering, food and beverage, human resources, finance, sales and marketing, security, and housekeeping.

Hospitality - Unit 02 - Hospitality Sectors

- Define and categorize hotel and restaurant organization and hotel segmentation.
- Discuss and identify aspects of the cruise industry and types of cruise ships, such as luxury, mega, adventure, and river.
- Identify components of leisure and business travel in the hospitality and tourism industry, including the role of conventions, sporting events and special events.
- Understand the differences between international, domestic and local hospitality and tourism.
- Identify and describe distinguishing traits of selected destinations, such as geographic locations, timezones, climate, and terrain.
- Define and discuss the following terms and concepts: traveling across time zones, prime meridian, International Date Line, and jet lag.
- Identify advantages and disadvantages by industry components working in the hospitality and tourism industry.
- Explains the best methods to accommodate different needs of travelers (i.e types of lodging properties and ownership structures (e.g. Air BnB, VRBO, etc.).
- Identify current and emerging trends in the hospitality and tourism industry, such as staycations, daycations, ecotourism, share economy vendors, and medical tourism.
- Explain factors that affect room rates and package plans, such as seasonality, property management, revenue management, booking engines, events, and occupancy percentage.
- Distinguish between amenities and services provided by various segments of lodging properties, such as limited, full-service, and extended-stay.
- Describe the different types, modes, and uses of transportation services available when traveling, and discuss advantages and disadvantages of each, including ground, air, and sea transportation.

- Communicate trends and aspects in the hospitality and tourism industry using social media techniques, tools, and process.
- Identify and describe various tools that provide up-to-date information for hospitality, recreation, and tourism professionals to use in meeting the needs of business and leisure travelers, such as websites, software, and digital applications.
- Complete a self-assessment and analysis of lifestyle goals and aspirations to evaluate for employment suitability in the hospitality and tourism industry.

Hospitality - Unit 03 - Communication Skills

- Identify and demonstrate effective communication skills.
- Identify techniques of appropriate phone etiquette, such as answering, placing on hold, recording messages, transferring, and complaint telephone calls.
- Discuss importance of providing clear directions, interpretations, descriptions, and explanations and active listening skills.
- Recognize the effect that communication has on the guest cycle process, including body language, phrases, acronyms, and jargon.
- Describe positive client relations for guests and identify circumstances that lead to negative customer experiences.
- Explain how to handle guest complaints courteously and professionally.
- Use novel approaches in creating problem-solving techniques to resolve customer-service conflicts, such as complaints, disputes, and negotiations.

Hospitality - Unit 04 - Guest Services

- Provide guest information services (concierge service).
- Identify types of food service operations, emerging trends (ie: home delivery services, Uber Eats, etc.), segments, franchises, and ownership structures.
- Identify and define the roles of Back of the House employees including executive chef, sous chef, expeditor, steward, garde manger, pâtissier/pâtisserie hospitality, recreation, and tourism.
- Explain typical fee and pricing categories for concierge services.
- Explain the objective of providing seamless guest experiences.

Hospitality - Unit 05 - Marketing and Promotion

- Describe the role and functions of the marketing department.
- Describe the concept of supply and demand, especially in regards to its importance for the hospitality industry.

- Explain why promotion of a hotel is important and identify effective hotel promotion ideas.
- Identify the stages of the guest experience cycle and the activities associated with each stage.
- Discuss the value of customer feedback and follow-up surveys on the guest cycle process.
- Prepare and promote sales, including banquet and group sales.
- Describe the function of customer rewards programs and how they operate.

Hospitality - Unit 06 - Products and Market Strategy

- Describe the products and amenities of hotels.
- Describe the elements of a marketing strategy.
- Target the market audience.
- Discuss the importance of developing networking skills to expand contacts within the industry.
- Explain the importance and impact of sensitivity to cultural, religious, and socio-economic diversities in relation to the guest cycle process.
- Recognize purpose, principles, and importance of selling.
- Describe the importance of suggestive selling and upgrading.
- Identify effective sales techniques, including the steps in the sales process, cross-selling, upselling, and alternative options.
- Explain motivation, needs, and expectations of the hospitality and tourism consumer and how it affects their lodging selection.

Hospitality - Unit 07 - Safety and Appearance

- Demonstrate knowledge of safety regulations as required in the hospitality industry, including OSHA regulations.
- Identify the travel documents and security mandates required by TSA for travelers of both international and domestic travel, and recognize the impact of improper documentation.
- Describe the importance of safety plans for various emergency situations relative to all types of tourism, including hurricane, evacuation, tornado, homeland security threat, and fire.
- Demonstrate appropriate personal hygiene, appropriate dress, and grooming for employment.
- Maintain guest and employee security procedures.

- Describe the legal rights of management, staff, and guests.
- Identify sensitive workplace issues and laws that regulate them, such as gender equity, cultural diversity, professional ethics, sexual harassment, disability, and age discrimination.

Hospitality - Unit 08 - Legal and Operational Considerations

- Describe hospitality industry-related legal responsibilities and issues, including ADA.
- Explain the need for accessibility to provide guests with appropriate accommodations for their needs.
- Examine liability in the hospitality industry and how to reduce it.
- Determine the role of risk management, liability insurance, OSHA regulations, and staff training in the industry.
- Explain the importance of maintaining confidentiality of business matters.
- Describe, interpret, and maintain room status records.
- Describe, interpret, and maintain housekeeping records.
- Explain procedures for health, safety, and the sanitation of rooms.
- Identify the vital role housekeeping in hospitality and the tools and supplies necessary for housekeeping tasks.
- Express the importance to both the business and clients of supporting and following company policies and procedures related to attendance, tardiness, email policy, social media, and the dress code.
- Identify various room types based on the number of occupants, bed availability, room layout, and amenities.

Hospitality - Unit 09 - Financial Operations

- Describe and process financial transactions.
- Describe night audit procedures.
- Operate point of sale systems and cash registers.
- Compare and contrast utilizing a point-of-sale (POS) system vs taking inventory by hand in the food and beverage industry.
- Identify universal terminology used in hospitality and tourism sales-related transactions, including cash, emerging technology, digital payment alternatives, checks, debit cards, credit cards, and discounts.
- Identify front office terminology commonly used in the hospitality industry.
- Explain functions of the reservations department.

Hospitality - Unit 10 - Management and Leadership

- Describe effective staff communication and its uses, including interpersonal, departmental, interdepartmental, and company-wide.
- Analyze the financial viability of a hospitality property.
- Determine employee schedules.
- Calculate payroll.
- Describe and operate electronic communication systems.
- Describe the function of forecasting.
- Understand the value and impact of calculation of hotel occupancy, average daily rate (ADR) and revenue available room (RevPAR).
- Identify and perform front office responsibilities.
- Demonstrate effective etiquette/netiquette in a business situation.
- Identify leadership qualities to improve the quality of work and the work environment.
- Work effectively in a team environment to improve the quality of work and the work environment.

Hospitality - Unit Sim

- Handle guest questions and requests at the hotel reception desk.

Pineapple Academy

Culinary Basics

Culinary Basics: 01 Kitchen Basics

- Report for work on time and treat colleagues with respect and dignity for a positive environment
- Use good communication when moving around the kitchen
- Handle pots, pans and knives correctly in the kitchen
- Understand the reasons and requirements for washing leafy produce
- Properly inspect, clean and process lettuce for production
- Understand the reasons and requirements for washing hard or porous produce
- Properly inspect, clean and process celery for production
- Understand the reasons and requirements for washing delicate produce
- Properly inspect, clean and process berries for production
- Properly set up your workstation
- Store all cleaning chemicals away from food prep area

- Learn which tools to use for various types of measuring
- Measure ingredients accurately when following a standard recipe
- Identify the parts of a knife
- Identify the parts of a blade
- Learn the correct name for different types of knives
- Understand proper use of each knife
- Properly hold different knives and use them correctly
- Care for and clean your own knives
- Explain the difference between steeling and sharpening a knife
- Demonstrate steeling a knife
- Demonstrate sharpening a knife

Culinary Basics: 02 Knife Cuts

- Demonstrate how to fine dice an onion
- Demonstrate how to julienne cut an onion
- Demonstrate how to stew cut onions
- Correctly peel the carrot
- Produce the size cuts of carrots required by a recipe
- Dice cantaloupe for fruit salad
- Cut cantaloupe into thin slices
- Cut cantaloupe into wedges with skin on
- Properly clean and process garlic for production
- Know how to store fresh, chopped garlic in refrigerator
- Demonstrate cutting the pepper open
- Demonstrate diced, julienne and symmetrical strips
- Properly clean and inspect parsley
- Demonstrate how to fine chop parsley
- Use parsley stems in a stock base
- Use paring knife to cut strawberries
- Demonstrate 3 different ways to cut strawberries
- Prep lemon/lime for cutting
- Demonstrate how to dice celery
- Demonstrate how to cut celery into sticks
- Demonstrate how to stew cut celery
- Cut broccoli into florets

- Cut broccoli into spears
- Peel and cut broccoli stem
- Cut cauliflower for steaming
- Cut small florets for veggie tray
- Know how to clean and process a cantaloupe
- Thin slice French bread to toast for soup garnish
- Cut French bread into pieces for a bread basket
- Thin slice nut bread into proper size for buffet service
- Cut into wedges for serving with fish
- Fine chop a lemon to add to fruit salad
- Properly cut limes to serve with beverages
- Prep orange for cutting
- Make a twisted orange garnish
- Make half moon orange garnish
- Peel orange completely and chop for fruit salad
- Cut romaine for use in salad
- Rewash and spin dry before storing
- Hold the slicing knife properly
- Demonstrate slicing roast beef into 2 ounce slices
- Weigh roast beef slices to ensure accuracy

Culinary Basics: 03 Hand Tools and Smallwares

- Grip melon baller firmly in your hand
- Pierce the flesh and roll to make a ball
- Cover cutting board with parchment paper
- Peel item away from you
- Select high temp or low temp rubber spatula for your task
- Discard any rubber spatulas that are damaged
- Use skimmer to remove particles from fryer oil
- Understand importance of keeping fryer oil free of debris
- Demonstrate use of commercial countertop mixer
- Properly clean mixer after use
- Select tongs that are right for you
- Use tongs to turn large cut of meat or other item
- Choose appropriate size whisk for the task

- Hold the whisk like a pencil to save energy during use
- Hold pizza wheel with a firm grip like a knife
- Cut pizza into symmetrical slices
- Know how to properly hold kitchen shears
- Cut grape bunches from stem
- Hold zester securely in hand
- Run zester from top to bottom of lemon
- Avoid white pith when zesting
- Identify parts of a slicer
- Set to correct thickness
- Slice meat or cheese with smooth back-and-forth motion
- Disassemble slicer and clean completely
- Correctly identify each size hotel pan
- Correctly identify each size sheet pan

Culinary Basics: 04 Cooking Techniques, Part 1

- Add items, close door and set timer
- Set temperature of combi oven
- Prepare water with salt and vinegar for eggs
- Remain present while cooking
- Use a perforated pan when steaming vegetables
- Use caution when opening the door
- Set timer and close door
- Temp item to ensure it is done
- Remove from steamer
- Set up basic breading procedure
- Use basic breading procedure
- Understand the applications and process for shallow frying
- Prepare item to fry
- Set temperature of fryer
- Cook for instructed amount of time
- Remove and cool item properly
- Understand what it means to par fry and why
- Understand difference between simmer and boil
- Prepare court bouillon for fish

Culinary Basics: 05 Cooking Techniques, Part 2

- Know how to conduct a yield test
- Oil and season the beef properly
- Describe mirepoix
- Define the term "baking"
- Demonstrate how to properly bake cut vegetables and muffins
- Understand the definition of baking
- Correctly set up your workstation
- Follow recipe instructions to make batter and bake
- Know how to test for doneness and properly cool
- Assemble cake for service
- Define braising and the purpose for it
- Properly sear meat as a first step to braising
- Sauté mirepoix and aromatics
- Deglaze pan and prep for oven
- Finish beef in the oven then prep for service

Culinary Basics: 06 Cooking Techniques, Part 3

- Understand the purpose of heat zones on a flat top griddle
- Identify when different types of meat are ready to turn
- Identify signs that it is time to turn items on the grill
- Understand proper sautéing techniques and sequencing
- Understand the purpose of heat zones on a charbroiler grill
- Demonstrate proper grilling setup and preparation
- Understand marinating techniques for seasoning
- Demonstrate proper meat grilling techniques
- Understand temperature control for food safety and quality
- Know the required temperatures for various types of cooked meat

Essentials for Front of House Service

Essentials for Front of House Service: 01 Covering the Basics

- Understand the distinction between FOH and BOH and your role as part of the FOH team
- Discover the key components of hospitality and the importance of mindset when approaching guests



- Learn the concept of "Being on Stage" and tips for delivering great performance while taking care of yourself
- Understand how your actions reflect on the establishment and impact the guest experience

Essentials for Front of House Service: 02 Being A Team Player

- Discover the importance of follow-up and self-care in maintaining service excellence
- Learn effective conflict resolution techniques, including active listening and knowing when to escalate for help
- Understand how to handle accidents and emergencies professionally, including distinguishing between routine accidents and true emergencies
- Recognize how personal brand, hygiene, and mise en place contribute to professional service

Essentials for Front of House Service: 03 Getting Ready for Service

- Know uniform policies and understand the importance of professional appearance, including hygiene and appropriate footwear
- Understand the role of checklists in successful service preparation and closing procedures
- Learn how to set up beverage stations and dining rooms efficiently for service
- Recognize the importance of pre-meal huddles, equipment checks, and attention to service details

Essentials for Front of House Service: 04 Meal Service Tips and Best Practices

- Learn proper guest greeting etiquette and order-taking procedures, including the importance of checkbacks and handling incorrect orders
- Understand the complete sequence of service from greeting to table clearing and preparation for the next guests
- Identify the elements and purpose of a proper bussing station setup to facilitate smooth transitions between dirty and clean service items

Food Service Sanitation, Part 2

Food Service Sanitation, Part 2

- Identify common food allergens and implement prevention protocols
- Set up and maintain organized, sanitary work stations throughout operations
- Apply safe food handling guidelines and prevent cross-contamination during service

- Define HACCP and understand the complete food safety journey
- Identify critical control points for food contamination using HACCP principles
- Follow proper sequence of wash, rinse, and sanitize steps for all equipment and smallwares
- Store cleaned and sanitized items properly to prevent contamination
- Demonstrate correct operation of dish machines and 3-compartment sinks
- Maintain proper water temperatures and accurate temperature logs for cleaning and sanitizing equipment
- Select, calibrate, and properly use food thermometers for temperature monitoring
- Sanitize thermometers and equipment between uses
- Follow emergency procedures and safety protocols for allergic reactions

Foodservice Essentials

Foodservice Essentials: 01 Hand Washing

- Effectively wash hands to keep yourself and others safe at work
- Understand how easily cross-contamination can happen in the kitchen and how to prevent it from happening

Foodservice Essentials: 02 Gloving

- Understand the basics of selecting gloves for the kitchen and the importance of organizing glove supplies for ease of use
- Understand when gloves are to be used, how to use them properly, and the importance of following kitchen policy
- Understand how gloved cross-contamination occurs and how to prevent it

Foodservice Essentials: 03 Team Member Hygiene

- Understand the clothing and hygiene that is expected of a team member when they check in for work and how that plays a role to keep everyone safe and help prevent food-borne illness.
- Understand how to prevent hair and other personal items from contaminating the food we are handling.
- Identify when it is safe for you to come to work and what to do when you become sick or injured during your work day.

Foodservice Essentials: 04 Foodservice Sanitation, Part 1

- Understand types of foodborne illness, which foods are most susceptible to contamination and how to handle them safely, and what you need to know to prevent chemical, physical or viral contamination.
- Understand the Temperature Danger Zone (TDZ). Understand all aspects of safe practice when cooking, storing and reheating food.
- Understand the proper way to safely hold, cool down and store cooked food. Understand refrigeration equipment options for temperature logs, as well as tips for managing a constant temperature and suggestions for food storage duration.

Foodservice Essentials: 05 Foodservice Sanitation, Part 2

- Understand the correct water temperature requirements for 3-compartment sinks and dish machines
- Demonstrate the importance of maintaining accurate temperature logs
- Understand the proper operation of a dish machine from pre-soaking through final rinse
- Demonstrate proper procedures for using a 3-compartment sink to clean and sanitize pots and pans
- Understand proper storage techniques for foodservice items to prevent contamination and breakage
- Demonstrate safe handling guidelines for food service items in the dining room
- Demonstrate proper tools and procedures for preparing and serving food for customers with allergies
- Understand the life-threatening nature of food allergies and demonstrate allergy awareness protocols
- Understand the steps required to maintain clean and sanitized work stations
- Demonstrate proper work station setup prior to food preparation
- Understand the essential role of food thermometers in kitchen safety
- Demonstrate proper thermometer use, including calibration and sanitizing procedures

Foodservice Essentials: 06 Foodservice Safety

- Identify the types of disasters that can affect food service operations, including internal, external, and combination disasters
- Understand individual roles and responsibilities during emergency situations
- Demonstrate knowledge of emergency policies, procedures, and planning protocols
- Understand how to develop a fire emergency plan in collaboration with local first responder agencies

- Demonstrate proper procedures for handling kitchen fires using available equipment
- Distinguish between potable and non-potable water sources
- Understand proper circulation and management of non-food items and disposables during emergency situations
- Demonstrate proper handling and storage procedures for chemicals in commercial kitchens
- Identify safety practices to prevent accidents involving hot objects and equipment
- Understand OSHA requirements and best practices for maintaining a safe work environment
- Demonstrate proactive pest control measures to prevent pest entry into commercial kitchens
- Understand reporting requirements for pest outbreaks
- Understand the role of ergonomics in kitchen safety and identify examples of proper and improper ergonomic practices
- Understand the purpose, process, and importance of safety audits in food service operations

Foodservice Essentials: 07 The Storage of Food

- Understand setting up a dry storage room properly along with tips on managing inventory efficiently
- Understand how the practice of "first in first out" (FIFO) plays a key role in limiting food waste and why it's important
- Understand why walk-in refrigerators are critical to proper food storage in a food service operation
- Understand the components of a walk-in refrigerator and the importance of each
- Understand efficient and safe food storage standards and inventory control inside a walk-in refrigerator
- Understand a full break down of the components of a walk-in freezer along with best practice steps for inventory storage and management of freezer items

Front of House Training

Front of House Training: 01 Being In Service

- Approach guests with empathy, respect, and professional communication skills
- Practice active listening and proper greeting etiquette including confident handshakes
- Work effectively as part of a team and manage conflict constructively

Front of House Training: 02 Preparing the Dining Room

- Set up tables properly for various meal types and maintain consistent dining room standards
- Establish appropriate atmosphere through lighting, sound, clean menus, and professional appearance
- Prepare dining areas for service including adaptive equipment, cleaning, and pre-meal coordination
- Follow regulations and policies for appearance, technology use, and HIPAA compliance

Front of House Training: 03 Sequence of Service

- Execute complete service sequence from greeting to table clearing
- Demonstrate proper etiquette for taking orders, conducting checkbacks, and handling service issues
- Maintain professional presentation and take ownership of the dining environment

Front of House Training: 04 Dining Room Cleaning

- Understand cleaning, sanitizing, and disinfecting procedures and regulatory requirements
- Use proper tools, chemicals, and PPE according to safety protocols
- Apply 3-step cleaning process and maintain separation between clean and dirty areas
- Store chemicals safely and produce SDS documentation as needed

Kitchen Basics, Part 1

Kitchen Basics, Part 1

- Demonstrate proper produce washing techniques for leafy, hard/porous surface, and delicate produce types
- Set up and maintain a safe, organized workstation with proper chemical storage
- Identify knife parts, types, and demonstrate proper knife use, care, steeling, and sharpening techniques
- Execute precise vegetable cuts including dicing, julienne, and specialty cuts for broccoli, cauliflower, celery, carrots, and onions
- Demonstrate proper citrus preparation techniques including wedges, garnishes, and zesting for lemons, limes, and oranges
- Perform accurate protein portioning and slicing techniques for meat products
- Execute proper leafy green preparation including cutting, washing, and storage procedures

- Demonstrate fruit preparation techniques including berries, melons, and stone fruits
- Apply proper herb and aromatics preparation including garlic processing and parsley preparation
- Execute bread cutting techniques for various service applications

Kitchen Basics, Part 2

Kitchen Basics, Part 2

- Follow professional kitchen safety and etiquette standards
- Communicate effectively and work respectfully in kitchen environments
- Disassemble equipment for thorough cleaning and sanitation
- Identify standard hotel pans and sheet pans by size
- Clean and maintain kitchen tools and equipment properly
- Practice safe knife and sharp tool handling procedures
- Use measuring tools accurately for recipe consistency
- Maintain fryer oil quality using appropriate tools
- Execute proper food preparation techniques with hand tools
- Demonstrate proper grip and handling techniques for hand tools and smallwares
- Select appropriate tools for specific culinary tasks
- Operate commercial kitchen equipment safely and effectively

Human Services

Open Textbooks

Nutrition Essentials

HLTH 09: Nutrition Essentials: CH06.00: Chapter 6: Protein

- Explain the ways to determine protein quality.
- Describe the various types of vegetarianism and strategies for vegetarians to consume adequate protein.
- Differentiate between a food allergy and a food intolerance and list top food allergens.
- Describe protein synthesis and the health consequences of protein imbalance.
- Calculate your recommended protein intake using the RDA for protein and the AMDR.
- Describe the roles, structure, and functions of proteins.
- Explain the process of denaturation and its consequences.

- Describe how proteins are digested and absorbed by our bodies.

HLTH 09: Nutrition Essentials: CH08.00: Chapter 8: Alcohol

- Discuss how alcohol is made and consumed.
- Describe the absorption and metabolism of alcohol in the body.
- List the symptoms of intoxication and how blood alcohol content can be influenced.
- Describe the health consequences of alcohol use and abuse.
- List symptoms of Alcohol Use Disorder.

HLTH 09: Nutrition Essentials: CH09.00: Chapter 9: Energy Balance

- Define hyperplasia vs hypertrophy of adipose tissue and their implications for weight loss or gain.
- Describe the prevalence of obesity in the US and obesogenic environments.
- Be able to calculate and categorize body mass index (BMI) given a particular weight and height and discuss the limitations of using BMI.
- Name the methods of assessment and factors that affect body composition and body fat distribution and how these relate to overall health.
- Discuss energy balance and be able to calculate your estimated energy requirements (EER).
- Summarize the factors involved in today daily energy expenditure (TDEE) and the factors affecting basal metabolic rate (BMR).
- Summarize factors affecting energy intake and energy expenditure.
- Describe health risks associated with being overweight or obese.
- Explain the characteristics of successful weight management.
- Differentiate among the various forms of weight loss surgery.

HLTH 09: Nutrition Essentials: CH10.00: Chapter 10: Disordered Eating

- Describe the role of body image and other risk factors in the development of disordered eating.
- Identify disordered eating behaviors.
- Differentiate among the characteristics of the most common eating disorders.
- Describe health risks associated with eating disorders and/or being underweight.
- Describe eating disorder treatment including goals.

HLTH 09: Nutrition Essentials: CH11.00: Chapter 11: Food Insecurity and Food Waste

- Define food security and food insecurity including the various levels of insecurity.
- Describe who is affected by food insecurity in the US and the world and why.

- Define food deserts and food swamps.
- Differentiate among programs in the US that address food insecurity.
- Describe the problem of food waste and interventions for its reduction.

HLTH 09: Nutrition Essentials: CH12.00: Chapter 12: Nutrition and Fitness

- Define physical fitness, physical activity, exercise, and other terms related to fitness.
- Describe the components of fitness and how they relate to overall health.
- Describe the physical activity guidelines and provide examples of how to reach them.
- Explain physical training principles.
- Explain how the body fuels physical activity.
- Describe how physical activity influences dietary requirements of macro- and micronutrients.
- Discuss special considerations for athletes such as glycogen supercompensation, anemia, RED-s Syndrome, fluids, caffeine, and weight management.

HLTH 09: Nutrition Essentials: CH15.00: Chapter 15: Key Functions of Micronutrients

- Describe the roles of micronutrients associated with energy metabolism.
- List common food sources for each micronutrient associated with energy metabolism, names of deficiency/toxicity conditions and their respective consequences.
- Describe the role of electrolytes in fluid balance, as well as the more specific functions, food sources, and effects of deficiency/toxicity for sodium, potassium, and chloride.

HLTH 09: Nutrition Essentials: CH16.00: Chapter 16: Key Functions of Micronutrients

- Describe the functions of calcium in the body, how calcium homeostasis is regulated, food sources of calcium, and effects of calcium deficiency and toxicity.
- Describe the synthesis, metabolism, and functions of vitamin D, as well as food sources and effects of deficiency and toxicity of vitamin D.
- Briefly describe the functions of phosphorus, magnesium, and fluoride in bone health and beyond, their food sources, and effects of deficiency and toxicity.
- Define osteoporosis, identify risk factors for development, and explain how osteoporosis can be prevented.
- Describe the role of blood, as well as the more specific functions, food sources, and effects of deficiency and toxicity for iron and vitamin K.
- Describe how free radicals develop and the role of antioxidants in fighting oxidative stress.

- Describe the general function of antioxidants, as well as the more specific functions, food sources, and effects of deficiency and toxicity for vitamin E, vitamin C, and selenium.
- Describe how vitamin A and beta-carotene contribute to normal vision, and know common food sources and effects of deficiency and toxicity of vitamin A.

HLTH 09: Nutrition Essentials: CH01.00: Chapter 1: Introduction to Nutrition

- Define health, nutrition, and disease
- List and describe the characteristics used to assess health status of an individual.
- Explain the difference between primary and secondary nutrient deficiency.
- Differentiate among risk factors, signs, and symptoms.
- Define the word "nutrient" and differentiate among the six classes of nutrients essential for health.
- Explain how energy values of food are determined, and list the three energy-yielding nutrients and their energy contribution.
- Describe measures of food quality and be able to calculate and compare energy densities of foods.
- Describe the importance of research and scientific methods to understanding nutrition.
- Analyze sources of nutrition information for reliability and credibility.

HLTH 09: Nutrition Essentials: CH02.00: Chapter 2: Choosing Foods Wisely

- Describe the action steps of the 2020-2025 Dietary Guidelines for Americans and ChooseMyPlate.
- Estimate your daily energy requirement and calculate Acceptable Macronutrient Distribution Ranges (AMDRs).
- Describe factors that affect food choices.
- Identify factors to consider when developing a healthy diet.
- Describe the current state of the American diet.
- Assess portion sizes of foods.
- Use the Nutrition Facts Label (NFL) to evaluate the nutritional information of food.
- Describe the types of claims allowed on food packaging and be able to categorize claims.

HLTH 09: Nutrition Essentials: CH03.00: Chapter 3: Food Safety

- Describe the major types and causes of foodborne illness and contamination.
- Identify groups that are at higher risk for foodborne illness.

- Describe the process government officials use to track foodborne illness.
- Explain the ways food manufacturers reduce the risk of foodborne illness.
- Describe the consumer level techniques for avoiding foodborne illness.

HLTH 09: Nutrition Essentials: CH04.00: Chapter 4: Human Digestion

- Differentiate between mechanical and chemical digestion and describe digestive activities in each category.
- Identify the anatomy of the digestive system and its secretions that aid digestion.
- Explain the functional physiology of the digestive system organs and their secretions.
- Describe how foods and nutrients are digested, absorbed, and transported, and stored.
- Describe digestive disorders that can compromise health including risk factors, symptoms, treatment, and prevention.

HLTH 09: Nutrition Essentials: CH05.00: Chapter 5: Carbohydrates

- Describe the different types of simple and complex carbohydrates.
- Discuss how carbohydrates are digested and absorbed in the human body.
- Summarize how blood glucose is regulated and what happens when glucose levels are not ideal.
- Describe the functions of carbohydrates in the body.
- Discuss the recommended types, amounts, and sources of carbohydrates in the diet including the AMDR, AI for fiber, and amount of added sugars.
- Describe the types, benefits, and risks of sugar alternatives.
- Summarize the long-term health implications and the dietary approaches to living with type 1 and type 2 diabetes and lactose intolerance.

HLTH 09: Nutrition Essentials: CH07.00: Chapter 7: Lipids

- Explain the structures of lipids (triglycerides, phospholipids, sterols) and how structure impacts its function as it relates to health and disease.
- Compare and contrast the structure of the following types of fats: triglycerides (saturated, monounsaturated, polyunsaturated, omega-3, and omega-6), phospholipids, and sterols
- Summarize the steps in lipid digestion, absorption, and transport through the body.
- Explain how lipids are used for energy and stored in the body.
- Discuss health issues related to lipids, including risk factors and signs/symptoms.

HLTH 09: Nutrition Essentials: CH13.00: Chapter 13: Water

- Describe how body water is distributed

- Describe the major aspects and organs involved in water regulation in the body.
- Explain the functions of water in the body.
- Discuss daily water gains and water losses including how the thirst mechanism works in the body.
- Discuss the consequences of too much or too little water.
- Describe how water is safe to drink and the pros and cons of bottled water.

HLTH 09: Nutrition Essentials: CH14.00: Chapter 14: Micronutrients Overview

- Define bioavailability and list characteristics that affect the bioavailability of micronutrients.
- Discuss the effects of processing on the nutrient content of foods.
- Identify nutrient dense food sources of micronutrients and differentiate between fortified and enriched foods.
- Describe the characteristics of fat- and water-soluble vitamins.
- Describe the characteristics of minerals and how they are classified in nutrition.
- Define each of the Dietary Reference Intakes (DRIs), explain how they are developed, and how they can be used to promote healthy diets.

HLTH 09: Nutrition Essentials: CH17.00: Chapter 17: Dietary Supplements

- Define a dietary supplement and describe a typical user.
- Define ergogenics and provide possible mechanisms of action.
- Describe how dietary supplements are regulated in the US.
- Differentiate among the claims allowed on dietary supplements by FDA and the labeling requirements.
- Describe recommendations for choosing dietary supplements wisely.

HLTH 09: Nutrition Essentials: CH18.00: Chapter 18: Nutrition Through the Lifecycle

- Summarize prenatal nutritional requirements and dietary recommendations.
- Discuss the most important nutritional concerns during pregnancy.
- Discuss the benefits and barriers related to breastfeeding.
- Examine feeding problems that parents and caregivers may face with their infants.
- Explore the introduction of solid foods into a toddler's diet.
- Discuss the most important nutrition-related concerns during childhood.
- Discuss the most important nutrition-related concerns during adolescence.
- Discuss the most important nutrition-related concerns during middle and old age.
- Explain how nutritional and lifestyle choices can affect current and future health

Information Technology

FTTS Publisher

Cyber Security Awareness

Cyber Security Awareness

- Identify when cyber security awareness should be practiced
- List two reasons for cyber security awareness
- List who is responsible for cyber security awareness
- List two cyber security risks
- List two safe email guidelines
- List two symptoms of potential cyber attacks

GCFGlobal Publisher

Computer Basics

Computer Basics 00: Introduction

- Understand What is a computer?
- Understand hardware vs. software
- Understand what are the different types of computers
- Understand PCs and Macs

Computer Basics 01: Hardware Basics

- Understand Basic Parts of a Computer
- Understand Buttons and Ports on a Computer
- Understand Inside a computer
- Understand Laptop Computers
- Understand Mobile Devices

Computer Basics 02: Software Basics

- Understand Operating Systems
- Understand Applications

Computer Basics 03: Using a Computer

- Understand Connecting to the Internet
- Understand Getting started with the Internet

- Understand the Cloud

Computer Basics 04: Using the Internet

- Understand the Cloud
- Understand Getting started with the Internet
- Understand Connecting to the Internet

Computer Basics 05: Safety and Maintenance

- Understand Keeping Your Computer Clean
- Understand Protecting Your Computer
- Understand Creating a Safe Workspace
- Understand Basic Troubleshooting Techniques

Computer Basics 06: Extras

- Understand How to Use Your Computer's Built-in Help
- Understand Learning a New Program
- Understand Bringing Your Files with You
- Understand Using Accessibility Features

Computer Basics 07: Quiz

- Completion

GoSkills

Intro to Ruby Programming

Intro to Ruby Programming: 02 Ruby Programming Basics

- Store data in variables and apply arithmetic, comparison and assignment operators.
- Comment code and deal with errors.

Intro to Ruby Programming: 01 Introduction

- Install Sublime and Git Bash.
- Install Ruby.

Intro to Ruby Programming: 03 Intermediate Ruby Concepts

- Create and use arrays and multi-dimensional arrays.
- Understand how and when to use loops, including while, until, for and each loops.
- Use classes, class getters and class setters.
- Create, use and manipulate hashes.

Intro to Ruby Programming: 04 Advanced Ruby Concepts

- Apply different modes for opening files and how to write and append data to a file.
- Install and use a third party Gem in your program for extra functionality.

Intro to Ruby Programming: 05 Fun with Ruby - Build a Math Flashcard Game!

- Build a math flashcard app.

Intro to Ruby Programming: 06 Final Exam

- Completion

Introduction to CSS

Intro to CSS: 07 Final Exam

- Completion

Intro to CSS: 01 Getting Started with CSS

- Understanding the basic CSS syntax.

Intro to CSS: 02 Basic CSS

- Add background colors, images and borders.
- Understand the difference between margins and padding.
- Change the formatting and alignment of text.
- Style links, lists and manipulate fonts.
- Understand CSS pseudo-classes and how to use them.

Intro to CSS: 03 Intermediate CSS

- Use gradients, shadows and rounded corners.
- Add buttons and pagination for easy navigation.

Intro to CSS: 04 Responsive Mobile Design with CSS

- Make your design responsive for mobile devices.

Intro to CSS: 05 Using the Bootstrap CSS Framework

- Setting up, using and modifying Bootstrap.

Intro to CSS: 06 Conclusion

- Understand how HTML, CSS and JavaScript work together.

Introduction to Data Analysis with Python

Intro to Data Analysis with Python: 04 Pandas Visualization

- Create data visualizations with Pandas.

Intro to Data Analysis with Python: 01 Development Environment Setup

- I can install Python on my operating system.

Intro to Data Analysis with Python: 02 Numpy

- Import and install Numpy.
- Use Numpy arrays, operations, and universal functions.

Intro to Data Analysis with Python: 03 Pandas

- Install Pandas data analysis toolkit.
- Use Pandas series and DataFrames.
- Clean and prepare your data with Pandas DataFrames.

Intro to Data Analysis with Python: 05 Linear Regression With SciKitLearn

- Install SciKitLearn to make predictions using essential machine learning.
- Create and analyze a linear regression model.

Intro to Data Analysis With Python: 06 Final Exam

- Completion

Introduction to HTML

HTML Intro: 01 Setting up your Development Environment

- Install the Sublime Text Editor.

HTML Intro: 02 Basic HTML Concepts and Code

- Author basic html tags and attributes.
- Create paragraphs, line breaks and headings.
- Format text to be bold, italic, block quotes.
- Style HTML elements with an inline CSS style tag.
- Add images to a website and make them clickable as links.

HTML Intro: 03 Intermediate HTML

- Create HTML tables, lists and forms.
- Comment code and where to do it.
- Create HTML links to navigate between different web pages or sites.

HTML Intro: 04 Real World Examples - Build a Resume Website Using Bootstrap

- Build a resume website using the Bootstrap CSS framework and templates.
- Make your website mobile responsive with Bootstrap.

HTML Intro: 05 Real World Examples - Build a Resume Website Using Templates

- Back up your code using Github and push live code to Heroku.

HTML Intro: 06 Final Test

- Completion

Introduction to JavaScript

JavaScript Intro: 07 Final Test

- Completion

JavaScript Intro: 01 Course Introduction

- Learn the syntax and output of JavaScript code.

JavaScript Intro: 02 Basic JavaScript

- Understand JavaScript statements and learn how to comment code.
- Store data in variables and apply arithmetic, comparison and logic operators.
- Understand the difference between strings, numbers, and Boolean data types.
- Utilize arrays to contain multiple items.

JavaScript Intro: 03 Intermediate JavaScript

- Master intermediate JavaScript such as objects, functions and conditional statements.

JavaScript Intro: 04 Using JavaScript for the Web

- Make changes to HTML elements by manipulating the DOM
- Make changes to CSS styles on a web page

JavaScript Intro: 05 AJAX

- Understand AJAX requests and responses

JavaScript Intro: 06 Building a Math Flashcard App

- Put together everything you've learned by building a math flashcard app with JavaScript and AJAX

Introduction to PHP

PHP Intro: 01 Setting Up a Development Environment

- Understand the fundamentals of how PHP works and the client/server relationship
- Set up your development environment
- Back up your code and set up version control with Github

PHP Intro: 02 Programming Basics

- Pass information between pages with Sessions
- Learn the different data types for PHP, including string, integer, float, and boolean
- How to use arithmetic, assignment, comparison, increment, logic and string operators
- Use if/else/elseif statements to test against conditions
- Understand basic arrays and how to sort arrays the quick and easy way
- How to process HTML Forms with GET vs POST
- Create and issue cookies to your website visitors

PHP Intro: 03 Building a Math Flashcard App

- Build a math flashcard app

PHP Intro: 04 Templating Out a Website

- Complete templating out a website

PHP Intro: 05 Final Test

- Completion

Introduction to Python

Intro to Python: 01 Intro and Setup

- Install Python on my operating system

Intro to Python: 02 Python Basics

- Understand data types including strings, numbers, lists, tuples, variables, and dictionaries
- Use assignment operators

Intro to Python: 03 Intermediate Python

- Use comparison operators and conditional statements like if, else, and elif
- Use membership and identity operators
- Import and create your own modules

- Write loops and loop control statements like while and for loops
- Write functions
- Open, close, rename and delete files
- Convert data types

Intro to Python: 04 Advanced Python

- Create and initialize classes, and calling attributes
- Use class inheritance for classes to interact with each other

Intro to Python: 05 Final Exam

- Completion

Microsoft Excel - Basic & Advanced

EXL Basic & Adv: 01 Getting to Know Excel

- Identify the terminology and elements of the ribbon.
- Recognize the main terms used to describe Excel's work canvas.
- Navigate the Excel Interface.
- Create and format a basic Excel file.
- Customize the Quick Access toolbar.
- Perform calculations by using the AVERAGE(), MAX(), MIN(), and SUM() functions.

EXL Basic & Adv: 02 Essential Formula Knowledge

- Understand Excel Formula and Function Anatomy.
- Perform calculations by using the AVERAGE(), MAX(), MIN(), and SUM() functions.
- Count cells by using the COUNT(), COUNTA(), and COUNTBLANK() functions.
- Perform conditional operations by using the IF() function.
- Format text by using RIGHT(), LEFT(), and MID() functions.
- Understand how dates and time work in Excel using the TODAY, YEAR, MONTH, DAY and DATE functions.

EXL Basic & Adv: 03 Intermediate Formula Knowledge

- Insert and remove hyperlinks.
- Perform temporal functions by using EOMONTH and EDATE functions.
- Use lookup methods including VLOOKUP, INDEX, MATCH, HLOOKUP and the basics of XLOOKUP.
- Understand the components of formula auditing including racing precedents, tracing dependents, and formula evaluation.

- Perform conditional operations by using the IF() function.

EXL Basic & Adv: 04 Optimizing Data

- Sort data by a single column or multiple columns.
- Filter data for specific words, dates and apply multiple filters to a single data table.
- Define a named range.
- Create Excel tables from cell ranges.
- Record macros.

EXL Basic & Adv: 05 Data Analysis

- Create, format, and calculate fields in Pivot Tables.
- Perform what-if analysis in Excel using the Scenario Manager and Goal-Seek.

EXL Basic & Adv: 06 Getting and Transforming Data

- Transform data through unpivoting data.
- Reshape data using Power Query.
- Import data into workbooks.
- Manually append tables using Power Query.

EXL Basic & Adv: 07 Presenting and Reporting

- Format cells and ranges.
- Use Excel's outlining tools.
- Apply number formats.
- Apply built-in and custom conditional formatting.
- Remove conditional formatting.
- Create charts of different styles, including column charts, bar charts, pie charts, line charts, and combination line and area charts.
- Add data series to charts.
- Apply chart layouts.
- Apply chart styles.

EXL Basic & Adv: 08 Validating and Updating

- Create a drop down list of valid options using data validation.
- Create, review and print Excel Comments and Notes.
- Apply cell styles.
- Use Data Validation to ensure that users enter valid data in input cells.

EXL Basic & Adv: 09 Advanced Formulas

- Write a formula that refers to more than one cell, a table column/row, or an entire table
- Filter records with a single condition or multiple conditions.
- Use basic functions of XLOOKUPS.

EXL Basic & Adv: 10 Preparing to Deploy

- Display and modify workbook content in different views, including custom views.
- Modify page setup.
- Adjust row height and column width.
- Customize headers and footers.
- Understand the setup process and weaknesses of Excel's security model.

EXL Basic & Adv: 11 Final Exam

- Completion

Microsoft PowerPoint 2010-2019

PPT 2019: 01 Interface and Basics

- Use the Outline Pane
- Create a new file and set basic file properties
- Modify slide master content
- Print notes pages
- Customize the ribbon or the Quick Access Toolbar to find and use hidden commands
- Change the slide master theme or background
- Display presentations in different views
- Present slide shows by using Presenter View
- Modify the notes master

PPT 2019: 02 Adding Text and Shapes

- Create slide layouts
- Modify slide layouts
- Apply formatting and styles to text
- Insert and change shapes
- Add text to shapes and text boxes
- Duplicate and position shapes on slides
- Align shapes, images, and text boxes
- Display alignment tools

- Group shapes and images

PPT 2019: 03 Pictures

- Insert and format images
- Remove picture backgrounds
- Use a photo album in a PowerPoint presentation

PPT 2019: 04 Info-graphics and Media

- Add and modify SmartArt graphic content
- Create and insert charts
- Modify charts
- Create and insert tables
- Apply built-in table styles
- Insert audio and video clips
- Insert SmartArt graphics

PPT 2019: 05 Animations and Transitions

- Animate text and graphic elements
- Configure animation effects
- Configure animation paths
- Apply and configure slide transitions

PPT 2019: 06 Slide Tasks

- Duplicate slides
- Modify slide order
- Create sections
- Rename sections
- Reset various types of object back to their original format

PPT 2019: 07 Delivering Your Presentation

- Print all or part of a presentation
- Print notes pages
- Print handouts
- Print in color, grayscale, or black and white
- Rehearse slide show timing
- Set up slide show recording options
- Configure slide show options

- Present slide shows by using Presenter View

PPT 2019: 08 New Design Features

- Configure transition effects
- Insert icons from the internet on your computer
- Insert 3D models
- Modify 3D models
- Animate 3D models
- Insert Summary Zoom slides

PPT 2019: 09 Final Exam

- Completion

Microsoft Word Basic and Advanced

MS Word Basic & Adv: 01 Word Screen Elements

- Operate the ribbon functionality
- Customize the Quick Access Toolbar
- Control where you type and how to navigate within the page
- Save documents in alternative file formats
- Format fonts
- Learn the base rules for letter layout
- Use cut, copy, and paste functions

MS Word Basic & Adv: 02 Essential Formatting Knowledge- The Home Ribbon

- Apply style sets
- Format text with fonts and colors
- Apply formatting by using Format Painter
- Clear formatting
- Apply text effects
- Apply basic paragraph format and alignment
- Apply background colors or borders to paragraphs
- Format paragraphs as numbered and bulleted lists
- Change bullet characters and number formats
- Set line and paragraph spacing and indentation
- Find and replace text

MS Word Basic & Adv: 03 The File Ribbon

- Find and use pre-designed templates
- Find and use "Recent Files"
- Share documents electronically
- Use ?File, Info? options to work on the technical file attributes

MS Word Basic & Adv: 04 The View Ribbon

- Apply different available document views
- Use the Navigation Pane to assist with document management
- Add the Navigation pane and zoom in and out of the document
- Use multiple windows to view the same or various documents side-by-side

MS Word Basic & Adv: 05 Intermediate Formula Knowledge- The Insert Ribbon

- Add a pre-designed cover page to your document
- Convert text to tables and vis versa
- Create and resize tables, rows, and columns
- Insert pictures and clip art
- Insert page, section, and column breaks

MS Word Basic & Adv: 06 Essential Page Layout Ribbon

- Set and apply page margins
- Change paper size and orientation depending on the document type
- Format text in multiple columns
- Set line and paragraph spacing and indentation
- Modify print settings

MS Word Basic & Adv: 07 References Ribbon

- Insert footnotes and endnotes
- Create and modify bibliography citation sources
- Insert citations for bibliographies
- Create and link captions to images and text
- Create an Index organized by topic or keyword
- Insert tables of contents
- Customize and update tables of contents
- Create an advanced level TOC using ?Mark Entry?

MS Word Basic & Adv: 08 Custom Styles

- Format text and capture it inside the Style Gallery for future use.
- Edit or remove styles from the Style Gallery
- Use reveal formatting
- Use the Selection Tool

MS Word Basic & Adv: 09 Mailing Ribbons

- Use the mailings ribbon to print an envelope or label for postal mail
- Auto-populate a sheet of labels with text pulled from a list
- Merge mailing lists onto envelopes, into a form letter, or into an email
- Troubleshoot label margins and email merges issues

MS Word Basic & Adv: 10 Review Ribbons

- Use features included in spellcheck, find a better word, or count the total words in a document
- Customize Word to use a different language for the document text, display, and help text. Also translate an entire document or just one word
- Add, review, reply to, resolve, and delete comments
- Track changes, and review, accept, and reject these changes
- Lock and unlock change tracking
- Use the compare documents feature

MS Word Basic & Adv: 11 Final Exam

- Completion

MOS Excel 2019 - GoSkills [sample]

4.0 : Perform Operations by using Formulas and Functions

- Insert relative, absolute, and mixed reference
- Reference named ranges and named tables in formulas
- Perform calculations by using the AVERAGE(), MAX(), MIN(), and SUM() functions
- Count cells by using the COUNT(), COUNTA(), and COUNTBLANK() functions
- Perform conditional operations by using the IF() function
- Format text by using RIGHT(), LEFT(), and MID() functions
- Format text by using UPPER(), LOWER(), and LEN() functions
- Format text by using the CONCAT() and TEXTJOIN() functions

Ruby on Rails for Web Development

Setting Up Your Development Environment

- Download, install, and use Ruby on Rails
- Set up my development environment with Github, BitBucket and Heroku
- Add, install and remove Gems to add third party functionality to my Rails app

SQL Introduction

SQL Intro: 01 Intro to Databases & SQL

- Understand the structure of databases with RDBMS concept

SQL Intro: 04 Selecting & Filtering Data 2

- Search within aggregate groups with HAVING clause
- Calculate data with Count, Average, and Sum functions

SQL Intro: 08 Final Test

- Completion

SQL Intro: 02 Microsoft SQL Server & Management Studio Setup

- Set up Microsoft SQL Server and SQL Management Studio
- Create a new database and add data to tables
- Back up and restore your database to protect your data

SQL Intro: 03 Selecting & Filtering Data 1

- Use a SELECT statement to retrieve data
- Filter records with WHERE, AND, OR clauses
- Arrange results with ORDER BY and GROUP BY clauses

SQL Intro: 05 Inserting, Updating & Deleting Data

- Update and remove data with UPDATE and DELETE statements

SQL Intro: 06 Combining & Joining Multiple Tables

- Combine and join tables with JOIN clauses

SQL Intro: 07 Other SQL Concepts

- Define these SQL concepts: subqueries, indexing, and primary key

Infosec

Digital Forensics

DF (01) Digital Forensics: Introduction to File Systems

- Examine different Windows and Linux file systems
- Partition and format file systems in Windows
- Format and wipe Linux file system

DF (02) Digital Forensics: Common Locations of Windows Artifacts

- Examine Windows Event Logs, IIS Logs, and Scheduled Tasks
- Examine the Startup, Windows, and System32 Folders

DF (03) Digital Forensics: Hashing Data Sets

- Image and Hash a Disk and Verify the Hashes of the Image
- Use Kali to Hash Images, Disks, and Partitions
- Use HashCalc to Verify Hashes

DF (04) Digital Forensics: Drive Letter Assignments in Linux

- Examine Linux drive letter assignments and mount drives
- Create primary and extended partitions in Linux
- Format disks in Linux and utilize the storage

DF (05) Digital Forensics: The Imaging Process

- Use FTK Imager.
- Use HELIX to image a system.
- Use Kali 2 to image a system.

DF (06) Digital Forensics: Introduction to Single Purpose Forensic Tools

- Use file hashing tools to verify integrity
- Mount a partition with deleted files and folders
- Use Foremost to carve files
- Use a HEX editor

DF (07) Digital Forensics: Introduction to Autopsy Forensic Browser

- Install the Autopsy forensic browser
- Create a case in Autopsy forensic browser
- Examine an image with Autopsy

- Generate a report

DF (08) Digital Forensics: FAT File System

- Examine the FAT and NTFS file systems
- Use a HEX editor to explore a FAT partition
- Analyze a FAT partition with Autopsy
- Verify and view image details

DF (09) Digital Forensics: The NTFS File System

- Examine the NTFS file system
- Use a HEX editor to explore an NTFS partition
- Verify and view the image details
- Analyze an NTFS partition with Autopsy

DF (10) Digital Forensics: Browser Artifact Analysis

- Meet my browser
- Analyze Internet Explorer
- Analyze Google Chrome
- Analyze Mozilla Firefox

DF (11) Digital Forensics: Communication Artifacts

- Use email messages and programs
- Examine emails in network traffic
- Use internet relay chat

DF (12) Digital Forensics: User Profiles and the Windows Registry

- Analyze the registry hives using RegViewer
- Capture a live Windows XP registry
- Analyze the registry hives using RegRipper

DF (13) Digital Forensics: Log Analysis

- Examine Windows Event Logs
- Examine Windows IIS Logs
- Examine Linux Log Files

DF (14) Digital Forensics: Memory Analysis

- Obtain a dump of physical memory using DumpIt
- Attack the victim system with Armitage

- Use Volatility to determine remote connections

DF (15) Digital Forensics: Forensic Case Capstone

- Analyze an NTFS partition with Autopsy
- Analyze and Report in Autopsy
- Verify and View the Image Details

Ethical Hacking & Systems Defense

EHSD (01) Ethical Hacking & Systems Defense: Performing Reconnaissance from the WAN

- Use nmap to determine the operating system and applications running on a system.
- Use tools to capture credentials on a system.
- Use remote desktop to log in to a system from captured credentials.
- Use nmap to perform banner grabbing.

EHSD (02) Ethical Hacking & Systems Defense: Scanning the Network on the LAN

- Use nmap to do a ping scan.
- Use Metasploit and Armitage to exploit vulnerabilities and breach a system.

EHSD (03) Ethical Hacking & Systems Defense: Enumerating Hosts using Wireshark, Windows, and Linux Commands

- Use Armitage to scan a network.
- Use system commands to enumerate or list resources on a target system.

EHSD (04) Ethical Hacking & Systems Defense: Remote and Local Exploitation

- Use nmap and OpenVas to scan a system.
- Use Greenbone to determine vulnerabilities of a system.
- Use Metasploit to exploit a system.
- Use Meterpreter to breach a system.

EHSD (05) Ethical Hacking & Systems Defense: Crafting and Deploying Malware Using a Remote Access Trojan (RAT)

- Use nmap/Zenmap to scan a network.
- Deploy malware on a system.
- Use Bruter to exploit a system vulnerability.
- Use remote desktop to breach a system.

EHSD (06) Ethical Hacking & Systems Defense: Capturing and Analyzing Network Traffic Using a Sniffer

- Configure the network interface to allow a sniffer to capture packets.
- Generate and capture traffic on the network.
- Analyze captured traffic in Wireshark.

EHSD (07) Ethical Hacking & Systems Defense: Social Engineering Using SET

- Compromise a Windows Server with the Social Engineering Toolkit
- Execute a spear-phishing attack
- Exploit the malware to steal data on a system

EHSD (08) Ethical Hacking & Systems Defense: Performing a Denial of Service Attack from the WAN

- Use a TCP flood to perform a denial-of-service attack.
- Use a UDP flood to perform a denial-of-service attack.
- Use an HTTP flood to perform a denial-of-service attack.

EHSD (09) Ethical Hacking & Systems Defense: Using Browser Exploitation to Take Over a Host's Computer

- Use Metasploit to exploit a web browser vulnerability.
- Use spear phishing to trick a user into launching a web browser vulnerability.
- Breach a host's computer using the web browser vulnerability.

EHSD (10) Ethical Hacking & Systems Defense: Attacking Webservers from the WAN

- Use nmap/Zenmap to scan a wide area network.
- Use Bruter to exploit SMTP.
- Use remote desktop with captured credentials to deface a web site.
- Cover your tracks from the hack you just performed.

EHSD (11) Ethical Hacking & Systems Defense: Exploiting a Vulnerable Web Application

- Use nmap to scan a network.
- Use Metasploit and Armitage to exploit a common web server vulnerability.
- Use Meterpreter to breach a system.

EHSD (12) Ethical Hacking & Systems Defense: Performing SQL Injection to Manipulate Tables in a Database

- Use nmap to scan a network.

- Use brute force to crack a user name and password of a MySQL database.
- Use the harvested credentials to exploit and breach a database.

EHSD (13) Ethical Hacking & Systems Defense: Breaking WEP and WPA and Decrypting the Traffic

- Decrypt wireless network traffic that uses WEP.
- Decrypt wireless network traffic that uses WPA.

EHSD (14) Ethical Hacking & Systems Defense: Attacking the Firewall and Stealing Data over an Encrypted Channel

- Use nmap/Zenmap to scan a network.
- Use metasploit/meterpreter to exploit a vulnerability on a target.

EHSD (15) Ethical Hacking & Systems Defense: Using Public Key Encryption to Secure Messages

- Use PKI to generate a certificate for a student and administrator.
- Use PKI to encrypt and decrypt a file.

Front End Web Development

FEWD (01) Front End Web Development: Website Development Basics

- Understand file management and hierarchy for website development.
- Identify the components of a website address, known as a Uniform Resource Locator (URL).
- Learn to prepare website components to be uploaded to website host on the World Wide Web.

FEWD (02) Front End Web Development: HTML5 Basics I

- Learn HTML5 syntax.
- Code the basic structure, semantic, and text support elements for a website page.
- Save a website file.

FEWD (03) Front End Web Development: HTML5 Basics II

- Code various types of lists in HTML.
- Code internal and external hyperlinks.
- Code a basic HTML table.

FEWD (04) Front End Web Development: HTML5 Basics III

- Code an image onto a website page.

- Code a Web form onto a website page.
- Create a variety of form elements within a website form.

FEWD (05) Front End Web Development: CSS3 Basics I

- Understand how CSS applies to HTML content.
- Learn CSS syntax.
- Add styling to website page content using external CSS.

FEWD (06) Front End Web Development: CSS3 Basics II

- Apply internal CSS to an HTML document.
- Apply inline (embedded) CSS to elements within an HTML document.
- Write an ID and apply it to an element within an HTML document.
- Write a class and apply it to one or more elements within an HTML document.

FEWD (07) Front End Web Development: Building a website

- Compose a completed website.
- Test website for accessibility.
- Make design selections based on standards and accessibility guidelines.

FEWD (08) Front End Web Development: Introduction to JavaScript

- Learn JavaScript syntax.
- Examine the Document Object Model (DOM).
- Edit the DOM in the browser console using JavaScript.

FEWD (09) Front End Web Development: JavaScript and HTML

- Use JavaScript to style HTML elements.
- Use JavaScript to insert HTML elements.
- Apply external JavaScript to an HTML file.

FEWD (10) Front End Web Development: Website Debugging

- Practice manually debugging HTML syntax
- Practice manually debugging CSS syntax
- Validate website files

Information Security Fundamentals

ISF (01) Information Security Fundamentals: Securing the pfSense Firewall

- Use nmap to scan for open ports on a pfSense firewall.

- Close unnecessary ports on a pfSense firewall.
- Add a secure service to a pfSense firewall.

ISF (02) Information Security Fundamentals: Implementing NAT and Allowing Remote Access

- Configure NAT
- Use Wireshark to understand how NAT works
- Use remote desktop on a network

ISF (03) Information Security Fundamentals: Implementing Common Protocols and Services

- Use Telnet and SSH on a network and understand why you would use one over the other.
- Use FTP and SCP on a network and understand why you would use one over the other.
- Use Wireshark to capture and observe network traffic.

ISF (04) Information Security Fundamentals: Examining Wireless Networks

- Use Wireshark to explore wireless traffic.
- Use Wireshark to export an image from HTTP traffic.

ISF (05) Information Security Fundamentals: Implementing Security Policies on Windows and Linux

- Secure the Windows login process.
- Audit login failures.
- Secure Linux.

ISF (06) Information Security Fundamentals: Data Backups in Windows, BSD, and Linux

- Backup pfSense Firewall.
- Backup files in Linux.
- Backup files in Windows.

ISF (07) Information Security Fundamentals: Incident Response Procedures, Forensics, and Forensic Analysis

- Exploit a system using Bruter.
- Use remote desktop using the stolen credentials from Bruter.
- Scan a network with nmap/zenmap.

ISF (08) Information Security Fundamentals: Crafting and Deploying Malware Using a Remote Access Trojan (RAT)

- Deploy malware on a system.
- Use Bruter to exploit a system vulnerability.
- Use remote desktop to breach a system.
- Use nmap/Zenmap to scan a network.

ISF (09) Information Security Fundamentals: Social Engineering Using SET

- Compromise a Windows Server with the Social Engineering Toolkit
- Execute a spear-phishing attack
- Exploit the malware to steal data on a system

ISF (10) Information Security Fundamentals: Breaking WEP and WPA and Decrypting the Traffic

- Decrypt wireless network traffic that uses WEP
- Decrypt wireless network traffic that uses WPA

ISF (11) Information Security Fundamentals: Deep Dive in Packet Analysis - Using Wireshark and Network Miner

- Use Wireshark to view protocol traffic.
- View protocols using Wireshark.
- Parse objects from network traffic.
- Use NetworkMiner.

ISF (12) Information Security Fundamentals: Remote and Local Exploitation

- Use nmap and OpenVas to scan a system.
- Use Greenbone to determine vulnerabilities of a system.
- Use Metasploit to exploit a system.
- Use Meterpreter to breach a system.

ISF (13) Information Security Fundamentals: Patching, Securing Systems, and Configuring Anti-Virus

- Exploit a Windows server that is not properly patched
- Harden a Windows server by patching the vulnerability

ISF (14) Information Security Fundamentals: Using Active Directory in the Enterprise

- Create an Organizational Unit and Users in Active Directory

- Set a Domain Level Policy in Active Directory
- Set an Organizational Level Policy in Active Directory

ISF (15) Information Security Fundamentals: Using Public Key Encryption to Secure Messages

- Use PKI to generate a certificate for a student and administrator.
- Use PKI to encrypt and decrypt a file.

Introduction to Operating Systems

IOS (01) Introduction to Operating Systems: Introduction to Operating Systems

- Interact with the computer via the graphical user interface and the command line interface.
- Use task manager to manage applications and tasks.
- Use file manager and the command line to create files and folders.
- Use the control panel/system monitor to manage memory and devices.
- Use the security features of both Windows and Linux.

IOS (02) Introduction to Operating Systems: Computer Security Basics

- Understand security policies and their application.
- Configure peripheral security.
- Configure Web browser security.
- Use miscellaneous security features of an operating system.
- Use authentication and authorization in an operating system.
- Protect data in an operating system.

IOS (03) Introduction to Operating Systems: Desktop Virtualization

- Install and configure desktop virtualization
- Create and configure a virtual machine
- Download, install, and configure Windows XP mode

IOS (04) Introduction to Operating Systems: Introduction to Windows 7

- Install and configure Windows 7.
- Use the features of Windows 7.
- Manage a Windows 7 system.
- Configure local security in Windows 7.

IOS (05) Introduction to Operating Systems: Introduction to Windows 8.1

- Install and configure Windows 8.1
- Use the features of Windows 8.1
- Manage a Windows 8.1 system
- Configure local security in Windows 8.1

IOS (06) Introduction to Operating Systems: Introduction to Windows 10

- Install and configure Windows 10.
- Use the features of Windows 10.
- Manage a Windows 10 system.
- Configure local security in Windows 10.

IOS (07) Introduction to Operating Systems: Supporting and Troubleshooting Windows

- Understand the registry
- Understand Windows user options and power options
- Install and manage device drivers
- Troubleshoot common Windows problems

IOS (08) Introduction to Operating Systems: Linux on the Desktop

- Install and configure Linux
- Use the features of Linux
- Manage a Linux system
- Configure local security in Linux

IOS (09) Introduction to Operating Systems: Connecting Desktops and Laptops to Networks

- Examine, set, and configure an IP address.
- Work with Internet browsers.
- Troubleshoot common network client problems.

IOS (10) Introduction to Operating Systems: Mobile Operating Systems

- Start up BlueStacks.
- Work with Google settings
- Install and remove Android apps
- Configure local security in Android

IOS (11) Introduction to Operating Systems: File Management in the Cloud

- Install and configure cloud storage (e.g., Dropbox, Google Drive)

- Use the features of cloud storage
- Manage a cloud storage software

Network Security Fundamentals

NSF (01) Network Security Fundamentals: Configuring a Windows based Firewall to Allow Incoming Traffic

- Set Up Services on the Internal Network
- Configure and Test the Windows-Based Firewall
- Use Internal Services from an External Machine

NSF (02) Network Security Fundamentals: Configuring a Linux based Firewall to Allow Incoming and Outgoing Traffic

- Test the Current Firewall and Install the Linux Firewall
- Configure and Test the Linux-Based Firewall
- Use Internal Services from an External Machine

NSF (03) Network Security Fundamentals: Implementing Secure DHCP and DNS

- Install and Configure DHCP
- Secure DHCP
- Install and Configure Secure DNS
- Secure DNS

NSF (04) Network Security Fundamentals: Configuring a Linux based Firewall to Allow Outgoing Traffic

- Set up and test external services
- Install the Linux-Based Firewall
- Test External Services on the Linux-Based Firewall

NSF (05) Network Security Fundamentals: Configuring Access Control Lists on a Linux Based Firewall

- Set up the network
- Enable services and configure firewall rules
- Test the firewall

NSF (06) Network Security Fundamentals: Configuring a Virtual Private Network with PPTP

- Test the Firewall and Configure the VPN Server
- Configure the VPN client

- Use Internal Services from an External Machine

NSF (07) Network Security Fundamentals: Configuring a Virtual Private Network with OpenVPN

- Install the Firewall and Configure the VPN Server
- Configure the VPN Server and Clients
- Use Internal Services from an External Machine

NSF (08) Network Security Fundamentals: Implementing RIP, RIPv2, and Securing RIP

- Configure RIP Version 1
- Configure RIP Version 2
- Secure RIP

NSF (09) Network Security Fundamentals: Intrusion Detection using Snort

- Set Up the Sniffer
- Detect Unwanted Incoming Traffic
- Detect Unwanted Outgoing Traffic

NSF (10) Network Security Fundamentals: Writing Custom Rules

- Penetrate a network
- Write rules to protect the network
- Generate traffic trigger alerts.

NSF (11) Network Security Fundamentals: Host-Based Firewalls

- Understand when a hacker enters the network
- Write rules to protect the network
- Understand when a hacker triggers alerts

NSF (12) Network Security Fundamentals: Configuring RADIUS

- Configure the RADIUS Server
- Set up the Remote Access Policies
- Connect to the RADIUS Server

NSF (13) Network Security Fundamentals: Domain Security

- Join a domain
- Create a domain account
- Create a group policy

NSF (14) Network Security Fundamentals: Configuring a Site to Branch a Virtual Private Network

- Set up the Branch Office Machines
- Configure the Main Office VPN Server and the Branch Server
- Access Resources on the Remote Network

NSF (15) Network Security Fundamentals: Closing Security Holes

- Attack a vulnerable Windows Server with Armitage
- Close a port on a Windows Server using the Windows Firewall
- Patch a system with Windows Update

Networking Fundamentals

NF (01) Networking Fundamentals: Configuring Port Redirection

- Test a firewall from an external network.
- Allow ICMP/ping in a firewall.
- Configure port redirection on a firewall.

NF (02) Networking Fundamentals: Implementing NAT and Allowing Remote Access

- Configure NAT.
- Use Wireshark to understand how NAT works.
- Use remote desktop on a network.

NF (03) Networking Fundamentals: IPv4 vs IPv6 ? Calculating, Configuring, and Testing

- Use decimal, binary, and hexadecimal conversions.
- Apply and test IPv4 subnet addresses.
- Apply and test IPv6 subnet addresses.

NF (04) Networking Fundamentals: Network Management

- Analyze CPU and network utilization with Performance Monitor.
- Use the Event Viewer to view logs.
- Manage patches and updates.

NF (05) Networking Fundamentals: Business Continuity - Disaster Recovery

- Create a data backup.
- Restore data from a data backup.
- Download a virus test file to test antivirus software.

NF (06) Networking Fundamentals: Breaking WEP and WPA and Decrypting the Traffic

- Decrypt wireless network traffic that uses WEP.
- Decrypt wireless network traffic that uses WPA.

NF (07) Networking Fundamentals: Closing Ports and Unnecessary Services

- Scan networks for open ports and services.
- Connecting to the open ports and services using Telnet and FTP.
- Closing unnecessary ports and services.

NF (08) Networking Fundamentals: Implementing Security Policies on Windows and Linux

- Secure the Windows login process.
- Audit login failures.
- Secure Linux.

NF (09) Networking Fundamentals: Network Security - Firewalls

- View and configure Windows Firewall with Advanced Security (WFAS) using Administrative Tools.
- Enable a firewall on a Linux system and enable firewall rules.
- Enable, view, and configure Windows Firewall using the Control Panel.

NF (10) Networking Fundamentals: Network Troubleshooting

- Use the problem-solving process to troubleshoot a suspected DNS issue using CLI utilities and resolve the issue.
- Configure an operational DHCP scope of addresses.
- Observe the effects of a deactivated DHCP scope and resolve the problem.

NF (11) Networking Fundamentals: TCP/IP Utilities

- Display computer, IP, DNS, and network connections information using the CLI.
- Use commands to test network connectivity.
- Observe the ARP process using Wireshark.

NF (12) Networking Fundamentals: The OSI Model

- Explain the physical layer.
- Explain the network layer.
- Explain the data link layer.
- Explain the application, presentation, and session layers.
- Explain the transport layer.

NF (13) Networking Fundamentals: TCP/IP Protocols ☐ The Core Protocols

- Use network utilities and protocols from the TCP/IP suite.
- Use a network packet analyzer, Wireshark, to examine the ARP protocol.
- Capture and analyze transport layer packets.

NF (14) Networking Fundamentals: TCP/IP Protocols ☐ Other Key Protocols

- Create and test a DHCP scope.
- Create and test a DHCP reservation.
- Create and test DNS records.

NF (15) Networking Fundamentals: Types of Networks

- Create a shared file.
- Testing the share and reassigning permissions.
- Map a drive to a server.
- Share and install a printer.
- Accessing a web and FTP server.

NF (16) Networking Fundamentals: Remote Access - RDP

- Connect to another machine using RDP.
- Configure the Routing and Remote Access (RRAS) server role.
- Use the built-in VPN client to create a VPN connection.

PC Maintenance and Repair

PCMR (01) PC Maintenance and Repair: Examining PC Hardware

- Examine the BIOS configuration using the CMOS utility.
- Use built-in Windows utilities to examine computer system hardware.
- Use a third-party software utility to examine computer system hardware.

PCMR (02) PC Maintenance and Repair: PC Operating Systems

- Use Regedit.
- Use Task Manager.
- Work with Microsoft Management Console.
- Perform disk management.

PCMR (03) PC Maintenance and Repair: Networking Essentials

- Configure Windows clients to connect to a workgroup network.
- Test network connectivity between computers.

- Share data and resources on the network.
- Use network command-line utilities.

PCMR (04) PC Maintenance and Repair: Printers

- Install and share a printer.
- Add the printer to a workgroup computer.

PCMR (05) PC Maintenance and Repair: Security Practices

- Create a local group policy.
- Share folders and permissions.
- Manage user accounts.

PCMR (06) PC Maintenance and Repair: Troubleshooting

- Use System Configuration tool.
- Manage processes with Task Manager.
- Examine Event Viewer.

PCMR (07) PC Maintenance and Repair: Disk Maintenance and Data Recovery

- Recover data.
- Backup data.
- Maintain disks.

PCMR (08) PC Maintenance and Repair: Command Prompt Tools

- Use some basic Windows CLI commands.
- Navigate the CLI.

PCMR (09) PC Maintenance and Repair: Remote Access

- Configure remote desktop.
- Configure remote assistance.

PCMR (10) PC Maintenance and Repair: Control Panel

- Configure Action Center and UAC settings.
- Configure Internet options through the Control Panel applet.
- Configure personalization options through the Control Panel applet.
- Configure power options through the Control Panel applet.

PCMR (11) PC Maintenance and Repair: Desktop Customization

- Examine the desktop customization features of Windows 7.

- Set Folder Options.

PCMR (12) PC Maintenance and Repair: Using Active Directory in the Enterprise

- Create an Organizational Unit and Users in Active Directory
- Set a Domain Level Policy in Active Directory
- Set an Organizational Level Policy in Active Directory

PCMR (13) PC Maintenance and Repair: Data Backups in Windows, BSD, and Linux

- Backup files in Linux.
- Backup files in Windows.
- Backup pfSense Firewall.

PCMR (14) PC Maintenance and Repair: Ubuntu Desktop Linux Installation

- Install Ubuntu using a custom hard disk layout.
- Make configuration changes to modify the Ubuntu GRUB 2 menu.

PCMR (15) PC Maintenance and Repair: Domain Security

- Join a domain.
- Create a domain account.
- Create a group policy.

PC Maintenance and Repair - V2

PCMR2 (01) PC Maintenance and Repair - V2: Examining PC Hardware-v2

- Use a third-party software utility to examine computer system hardware.
- Use built-in Windows utilities to examine computer system hardware.
- Examine the BIOS configuration using the CMOS utility.

PCMR2 (02) PC Maintenance and Repair - V2: PC Operating Systems-v2

- Use Regedit.
- Perform disk management.
- Work with Microsoft Management Console.
- Use Task Manager.

PCMR2 (03) PC Maintenance and Repair - V2: Networking Essentials-v2

- Configure Windows clients to connect to a workgroup network.
- Test network connectivity between computers.
- Use network command-line utilities.

- Share data and resources on the network.

PCMR2 (04) PC Maintenance and Repair - V2: Printers-v2

- Add the printer to a workgroup computer.
- Install and share a printer.

PCMR2 (05) PC Maintenance and Repair - V2: Security Practices-v2

- Share folders and permissions.
- Create a local group policy.
- Manage user accounts.

PCMR2 (06) PC Maintenance and Repair - V2: Troubleshooting-v2

- Use System Configuration tool.
- Examine Event Viewer.
- Manage processes with Task Manager.

PCMR2 (07) PC Maintenance and Repair - V2: Disk Maintenance and Data Recovery-v2

- Recover data.
- Backup data.
- Maintain disks.

PCMR2 (08) PC Maintenance and Repair - V2: Command Prompt Tools-v2

- Use some basic Windows CLI commands.
- Navigate the CLI.

PCMR2 (09) PC Maintenance and Repair - V2: Remote Access-v2

- Configure remote assistance.
- Configure remote desktop.

PCMR2 (10) PC Maintenance and Repair - V2: Control Panel-v2

- Configure Internet options through the Control Panel applet.
- Configure power options through the Control Panel applet.
- Configure personalization options through the Control Panel applet.
- Configure Action Center and UAC settings.

PCMR2 (11) PC Maintenance and Repair - V2: Desktop Customization-v2

- Examine the desktop customization features of Windows 7.
- Set Folder Options.

PCMR2 (12) PC Maintenance and Repair - V2: Using Active Directory in the Enterprise

- Set an Organizational Level Policy in Active Directory
- Set a Domain Level Policy in Active Directory
- Create an Organizational Unit and Users in Active Directory

PCMR2 (13) PC Maintenance and Repair - V2: Data Backups in Windows, BSD, and Linux

- Backup files in Windows.
- Backup files in Linux.
- Backup pfSense Firewall.

PCMR2 (14) PC Maintenance and Repair - V2: Domain Security

- Create a group policy.
- Create a domain account.
- Join a domain.

PCMR2 (15) PC Maintenance and Repair - V2: Ubuntu Desktop Linux Installation 18.04.1

- Install Ubuntu using a custom hard disk layout
- Install patches using a software updater
- Upgrade to a new version of Ubuntu

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Pointful Education

Augmented and Virtual Reality

AVR 00: Start Here

- Completion

AVR 01: Introduction to Augmented and Virtual Reality

- Define augmented reality (AR), virtual reality (VR), and mixed reality (MR)
- Explain the difference between AR and VR
- Predict and discuss whether AR or VR will be the more widely adopted technology
- Describe the 3 primary components of a Heads Up Display (HUD)

- Evaluate the historical contributors and contributions that have led to today's AR/VR systems

AVR 02: Augmented Reality Systems

- Define key terms related to Augmented Reality (AR)
- Differentiate between augmented reality modes on phones, headsets, and contact lenses
- Examine technologies that allow AR to function, including motion tracking, mapping, light estimation, and software
- Compare the 4 types of AR technology categories
- Evaluate companies that make AR systems
- Identify potential career opportunities within AR systems and educational paths to enter those careers

AVR 03: Virtual Reality Systems - Introduction

- Define key terms related to VR
- Examine the hardware used in VR, including headsets, controllers, sensors, audio, sensory (haptics) and other components
- Describe tracking and other technologies that make VR work
- Describe categories of virtual reality based on levels of immersion, including computer-assisted virtual environments
- Compare companies that make VR systems and distinguish between tethered and untethered systems
- Identify potential career opportunities within VR systems and educational paths to enter those careers

AVR 04: Augmented and Virtual Reality in Gaming

- Identify potential career opportunities within AR/VR game development and educational paths to enter those careers
- Define key terms related to AR/VR gaming
- Evaluate features, genres, and types of AR gaming
- Evaluate features, genres, and types of VR gaming
- Predict when they will first use AR/VR in a gaming application
- Determine the impact that AR/VR gaming will have on society
- Discuss the pros and cons of AR/VR gaming

AVR 05: Augmented and Virtual Reality in Education

- Define key terms related to AR/VR in education
- Evaluate applications of AR/VR in education in the classroom and in corporate training
- Predict when they will first use AR/VR in school
- Determine the impact that learning using AR/VR could have on educational outcomes
- Discuss potential drawbacks and distractions that AR/VR could cause in education
- Identify potential career opportunities within AR/VR in education and educational paths to enter those careers

AVR 06: Augmented and Virtual Reality in Entertainment

- Define key terms related to AR/VR in entertainment
- Predict when they will first use AR/VR to watch a live event
- Examine applications of AR/VR in entertainment, including sports applications, location-based entertainment, and cinematic virtual reality
- Compare cinematic VR with traditional movies and TV and describe the changes in writing and production that cinematic VR will require
- Discuss whether AR and VR devices isolate or connect people

AVR 07: Augmented and Virtual Reality in Healthcare

- Describe how AR/VR are used in therapy to overcome psychological issues
- Examine the use of AR/VR systems by medical professionals
- Determine the impact that AR/VR healthcare applications will have on society and jobs
- Identify potential career opportunities within AR/VR in healthcare and educational paths to enter those careers
- Define key terms related to AR/VR in healthcare
- Evaluate uses of AR/VR in healthcare by patients

AVR 08: Augmented and Virtual Reality in Architecture, Engineering, and Construction

- Define key terms related to AR/VR in architecture, engineering, and construction
- Evaluate applications of AR/VR in architecture, real estate, engineering, and construction
- Describe ways that AR/VR technology can improve safety and save money on construction projects
- Evaluate companies that make virtual reality systems or solutions for the engineering and construction industries
- Discuss potential risks from product liability of VR and AR devices

- Identify potential career opportunities within AR/VR in engineering and educational paths to enter those careers

AVR 09: Augmented and Virtual Reality in Shopping

- Define key terms related to AR/VR in shopping and retail
- Predict when they will first use AR/VR while shopping
- Evaluate applications of both AR and VR in shopping
- Discuss the potential impact of AR/VR in shopping on jobs and the economy
- Describe the pros and cons of marketing within AR/VR
- Identify entrepreneurs within AR/VR in shopping and explain their ideas and contributions to this field
- Research a startup company in the AR/VR shopping field and describe their product or service

AVR 10: Social Virtual Reality and Telepresence

- Define key terms related to AR/VR in telepresence and telerobotics
- Evaluate telepresence, telerobotics, and social applications of AR/VR
- Examine potential courtroom applications of AR/VR technology
- Discuss and predict the long-term impact of AR/VR on brain functioning
- Identify potential career opportunities within telerobotics/telepresence and educational paths to enter those careers

AVR 11: Course Wrap-up/Final Exam

- Completion

Cloud Technologies and the Internet of Things

CLOUD 00: Start Here

- Completion

CLOUD 01: What is the Internet of Things?

- Define Internet of Things (IoT), machine-to-machine, and "smart" machine
- Identify key trends that are driving technological development: miniaturization, affordability, and de-wireization
- Evaluate Moore's law and Metcalfe's law and describe how they have contributed to the growth of connected machines
- Recognize the number of connected devices globally and predict the growth of connected devices

- Examine the impact that artificial intelligence, fog computing, and blockchain technology will have on the growth of IoT

CLOUD 02: The Internet and the Cloud

- Outline the history of the internet and the world wide web
- Define cloud computing and fog computing and explain how they work
- Identify key contributors to internet and cloud computing technology
- Differentiate between the internet and the internet of things
- Describe the technology adoption curve and examine examples of adoption such as the internet and mobile phones
- Discuss the impact the internet has had on industries such as mail delivery and bookstores

CLOUD 03: Internet of Things at Home

- Define key terms related to IoT applications in the home
- Describe use cases of the Internet of Things within a house
- Evaluate how the use of IoT in home systems such as heating, cooling, and sprinklers can improve resource efficiency and reduce maintenance problems
- Discuss the benefits and drawbacks of relying on connected devices within the home
- Evaluate the challenges of reliability on connected devices that may malfunction, run out of batteries, or be hacked

CLOUD 04: Internet of Things and People

- Define wearable technology and describe how wearable technology relates to the internet of things
- List and describe key sensors used in various wearable applications
- Describe applications of wearable technology across fitness & sports and business
- Examine the potential risks of utilizing wearable technologies
- Evaluate how wearable technology can contribute to digital distraction and what students can do to increase focus and attention
- Identify career opportunities in wearable technologies and educational paths to enter those careers

CLOUD 05: The Industrial Internet of Things

- Define key terms related to the Industrial IoT
- Examine companies and projects that are utilizing the Industrial IoT
- Discuss how IoT technologies will enable Factories to become more efficient

- Identify the risks associated with ransomware attacks on the IoT
- Identify career opportunities in the industrial internet of things and educational paths to enter those careers

CLOUD 06: Internet of Things in Healthcare

- Define key terms related to Healthcare IoT
- Describe use cases of the Internet of Things in healthcare, including: blood pressure monitors, blood sugar monitors, in-home medication dispensers
- Examine how IoT technology can be used track and monitor contagious diseases
- Evaluate key risks associated with the IoT and connected devices
- Discuss the importance of data collection in healthcare and describe how IoT devices collect and process data
- Identify career opportunities in the IoT at Healthcare industry and educational paths to enter those careers

CLOUD 07: Internet of Things and Cars

- Describe applications of the Internet of Things in cars, including tire pressure monitoring, connected cars, and driverless car sensors
- Identify key technologies that enable self-driving cars (Lidar, radar, other sensors)
- Define algorithm and explain how algorithms allow self-driving cars to operate
- Compare the benefits and limitations of utilizing sensors and artificial intelligence in transportation
- Determine the impact of robots on jobs in transportation
- Identify career opportunities in self-driving cars and educational paths to enter those careers

CLOUD 08: Internet of Things at the Store

- Define key terms related to IoT applications in retail
- Describe use cases of the Internet of Things in stores
- Examine how the IoT will impact the supply chain of how products are delivered
- Identify and discuss risks, including privacy and security, with the use of IoT in stores
- Discuss the impact of IoT on jobs in retail and the environment
- Identify career opportunities in IoT Retail and educational paths to enter those careers

CLOUD 09: Internet of Things and Farming

- Describe use cases of the Internet of Things in farming

- Discuss the challenges of feeding a growing global population and how improvements from IoT can help with this challenge
- Define key terms related to IoT applications in agriculture
- Describe the change in agriculture employment from 1900 to today and the causes of the change
- Examine how the use of IoT applications in agriculture could produce environmental benefits
- Identify career opportunities in Agricultural technology and educational paths to enter those careers

CLOUD 10: Internet of Things and Cities

- Define key terms related to IoT applications in cities
- Describe use cases of the Internet of Things within cities
- Evaluate the impact of smart cities on public sector jobs
- Discuss the potential for smart cities to impact the environment positively or negatively
- Examine efforts by companies and governments to address risks and concerns of the Internet of Things
- Identify career opportunities in the IoT and Cities industry and educational paths to enter those careers

CLOUD 11: Course Wrap-up/Final Exam

- Completion

Cybersecurity

Cyber 00: Module 0

- Completion

Cyber 01: Introduction to Cybersecurity

- Explain the various elements that make up the security taxonomy used by the U.S. Computer Emergency Readiness Team (CERT) and describe the challenges associated with achieving and maintaining computer security.
- Discuss the range of potential consequences of various forms of security breaches and describe various defense mechanisms, techniques, and methodologies.
- Compare and contrast mechanisms employed in passive and active cyber-attacks and describe the difference between an inside and an outside attack.

- Describe vulnerabilities associated with each element of the CIA Triad and explain the differences between hardware, software, data, and network assets susceptible to cyber-attack.
- Describe the tools and technologies used in cybersecurity and define intrusion detection and discuss its role in cybersecurity.
- Explain what is meant by the term countermeasures and describe the role recovery plays in cybersecurity.

Cyber 02: The Basics of Cybersecurity Part I

- Describe the basic categories of vulnerabilities associated with cybersecurity (i.e., hardware, software, network, human, physical, and organizational) and how social networks such as Facebook are cybersecurity targets.
- Describe footprinting and explain how it is used to reveal system vulnerabilities and explain why default values and technical controls are points of vulnerability and describe the hardening efforts being taken by government and industry.
- Describe the process of port scanning and explain why it is so prevalent in cybersecurity.
- Describe what is meant by password strength and explain its relationship to vulnerability, distinguish between a weak and a strong password and describe how intruders can cover their tracks.
- Describe the circumstances under which a computer system is vulnerable to a denial-of-service attack and spoofing as an attack mechanism and discuss its consequences and common motivating factors for its use.
- Describe the introduction of malware, spyware, and grayware as an attack mechanism and discuss its consequences and common motivating factors for its use.
- Describe the use of computer viruses or worms and Logic Bombs as an attack mechanism and discuss its consequences and common motivating factors for its use.
- Describe botnet, rootkit, and Trojan Horse as an attack mechanism and discuss its consequences and common motivating factors for its use.

Cyber 03: The Basics of Cybersecurity Part II

- Describe DNS poisoning as an attack mechanism and discuss its consequences and common motivating factors for its use as well as buffer overflow as an attack mechanism and discuss its consequences and common motivating factors for its use.
- Describe wired/media-agnostic network attacks including but not limited to Man-in-the-middle/Arp spoofing, and DHCP.

- Examine safe wireless configuration options and dealing with wireless issues as an added attack surface.
- Describe Cryptographic Algorithms including Hashing Functions, Symmetric Keys, Asymmetric Keys, and Kerberos.
- Describe steganographic techniques including network steganographic methods (e.g., VOIP, WLAN), digital steganographic methods (e.g., image encryption, audio, mimic functions, video, packet manipulation), and steganographic techniques.
- Understand how cryptography and digital signatures address security concepts including confidentiality, integrity, authentication, non-repudiation, and access control.
- Define PKI (Public Key Infrastructure) including certificates (e.g., policies, practice statements), revocation, and trust models.

Cyber 04: Intrusion and Intrusion Detection Systems Part I

- Describe the role of a Certificate Authority (CA) as well as Registration Authority (RA) and its relevance to security certificates.
- Describe the events that make up the lifecycle of a certificate and how root certificate distribution works.
- Compare and contrast SSL/TLS X.509-compliant certificates with PGP-compliant certificates.
- Define intrusion and describe the classes of intruders (i.e., masquerader, misfeasor, clandestine user).
- Describe what is meant by a hacker and discuss their role in cybersecurity as well as compare and contrast the "black hat" and "white hat" hacker cultures (i.e., computer criminal versus computer security expert).
- Describe intrusion and user behavior, the three logical components that comprise an IDS (i.e., sensors, analyzers, user interface), and describe the essential requirements for any IDS.
- Describe anomaly detection, specifically threshold and profile-based approaches as well as the types of audit records employed in intrusion detection (i.e., native, detection-specific).

Cyber 05: Intrusion and Intrusion Detection Systems Part II

- Describe signature detection, specifically rule-based anomaly, and penetration identification approaches.
- Describe the primary approach for network-based intrusion detection.

- Compare and contrast inline and passive sensors and discuss typical placement of sensors in a network-based IDS environment as well as describe the operation, typical activities, and outputs of an intrusion detection system.
- Describe some of the limitations of intrusion detection systems and differentiate between an intrusion detection system (passive) and an intrusion prevention (reactive) system.
- Compare and contrast several of the intrusion detection systems available on the current market.

Cyber 06: Intrusion Prevention

- Describe the process of monitoring/detecting port scanning attacks and associated patterns and explain how the monitoring and analysis of network traffic can be used to detect intrusion.
- Describe the purpose and limitations of firewalls and the four types of firewalls (i.e., packet filtering, stateful inspection, application-level gateway, circuit-level gateway) as well as VLAN and other basic network isolation techniques.
- Describe the use of honeypots as an intrusion prevention technique and explain how security policies are used to prevent intruders.
- Explain how Access Control Lists (ACLs) are used to prevent intrusion and describe the limitations of traffic monitoring within virtual networks.
- Discuss the primary vulnerability of virtual operating systems and describe the **hypervisor** and explain its role in securing a virtual environment.

Cyber 07: Social Engineering and Fundamental Security Design Principles

- Define social engineering and describe its role in cybersecurity and discuss common mechanisms that constitute social engineering (e.g., phishing, baiting, quid pro quo, pretexting)
- Describe the variety of attacks targeting the human element and countermeasures that can be used to counter social engineering attacks as well as discuss the three overarching security design principles (i.e., only necessary, simple, ease of use).
- Describe the following principles; principle of least privilege as it relates to computer security, principle of separation of duties as it relates to computer security, principle of defense-in-depth as it relates to computer security, principle of fail-secure or fail-safe as it relates to computer security, principle of economy of mechanism as it relates to computer security, and principle of complete mediation as it relates to computer security.

- Describe the following principles; principle of open design as it relates to computer security, principle of least common mechanism as it relates to computer security, principle of psychological acceptability as it relates to computer security, principle of leveraging existing components as it relates to computer security, principle of weakest link as it relates to computer security, and principle of a single point of failure as it relates to computer security.

Cyber 08: Careers in Cybersecurity

- Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
- Explain emergency procedures to follow in response to workplace accidents.
- Understand Hats and Teams terminology as it relates to careers in cybersecurity.
- Explain Blue Team – day-to-day defensive security and DFIR – Blue Team’s First Responders as it relates to careers in cybersecurity.
- Understand Penetration Testing – hacking for security as it relates to careers in cybersecurity.
- Compare and contrast social engineering, creating a good security policy as it relates to careers in cybersecurity.

Cyber 09: Course Wrap-up/Final Exam

- Completion

Introduction to Artificial Intelligence

IAI 00: Module 0: Start Here

- Completion

IAI 01: Intro to Artificial Intelligence

- Describe the history of artificial intelligence
- Differentiate between robotics and artificial intelligence
- Define keywords related to artificial intelligence
- Examine the Turing test and theories of singularity
- Outline the topics that will be covered throughout this course (algorithms, machine learning, deep learning, bias and ethics, applications, and AI’s impact on the future)

IAI 02: Perception and Intelligence

- Describe how computers perceive the world using sensors and data
- Differentiate between human intelligence and machine intelligence

- Compare general vs. narrow artificial intelligence
- Identify the limitations of machine perception
- Evaluate the mechanics of how AI is used in picture/video recognition, and biometrics analysis

IAI 03: Algorithms In AI

- Define algorithm and decision tree
- Create a basic decision tree algorithm
- Describe how algorithms form the basis of artificial intelligence
- Provide examples of algorithms that students interact with daily
- Evaluate how AI and algorithms are used in the field of astronomy to find exoplanets

IAI 04: Machine Learning

- Define machine learning
- Outline four drivers behind the emergence of machine learning 1) improvements in computing speed/memory, 2) transition from physically to electronically stored data, 3) easier access to data through the internet, 4) low-cost, high resolution digital sensors
- Describe how training data is acquired and used
- Compare supervised learning, unsupervised learning, and reinforcement learning
- Evaluate the use of AI and machine learning to generate movie and music recommendations

IAI 05: Deep Learning & Neural Networks

- Define deep learning
- Explain the components of a neural network
- Differentiate between deep learning and machine learning
- Describe how deep learning will affect society and the economy
- Evaluate how AI and deep learning is used to operate self-driving cars

IAI 06: Humans and AI

- Describe the ways in which humans interact with AI through interfaces and robotics
- Define design thinking and explain how it relates to AI
- Outline ways that AI can be used for social good
- Discuss the limitations of current AI technology
- Evaluate the use of AI in personal assistants, chatbots, and language translators

IAI 07: Ethical AI and Biases

- Describe ethical challenges that AI presents and define what ethical criteria AI systems should be required to meet
- Identify and outline areas where AI could be used in harmful ways such as mass surveillance and contribute to a loss of privacy
- Discuss the cause and problems of biased AI systems
- Describe how the lack of diversity in programming and AI jobs can impact and perpetuate bias
- Evaluate the uses of AI in the U.S. criminal justice system in places like policing applications, and sentencing / parole decisions

IAI 08: AI and Jobs

- Compare the potential for both job destruction and job creation through AI
- Describe how AI will impact all jobs across the economy and how people will work together with AI in future jobs
- List the skills and educational requirements necessary to have a career in an AI field
- Examine career possibilities in the field of Artificial Intelligence
- Evaluate the use of AI in healthcare diagnostics and analyze the effects it will have on future jobs in healthcare

IAI 09: Course Wrap-up / Final Exam

- Completion

Java SE8

Java SE8 00: Start Here

- Completion

Java SE8 01: Introduction to Coding and Java

- Learn how to think in code and find solutions to basic mathematical problems.
- Understand algorithms and flowcharts.
- Understand the basics of Java, including how to use compilers and interpreters, text editor, IDE, CLI, and GUI.
- Write a basic Hello World program in Java and understand key Java terminology.

Java SE8 02: Java Basics

- Import other Java packages to make them accessible in your code.

- Create executable Java applications with a main method; run a Java program from the command line; produce console output.
- Compare and contrast the features and components of Java such as platform independence, object orientation, encapsulation, etc.
- Define the scope of variables.
- Define the structure of a Java class.

Java SE8 03: Working With Java Data Types

- Declare and initialize variables (including the casting of primitive data types)
- Differentiate between object reference variables and primitive variables
- Know how to read or write to object fields
- Explain an Object's Lifecycle (creation, "dereference by reassignment" and garbage collection)
- Develop code that uses wrapper classes such as Boolean, Double, and Integer

Java SE8 04: Using Operators and Decision Constructs and Creating and Using Arrays

- Use Java operators; use parentheses to override operator precedence
- Test equality between Strings and other objects using == and equals ()
- Create if and if/else and ternary constructs.
- Use a switch statement
- Declare, instantiate, initialize and use a one-dimensional array
- Declare, instantiate, initialize and use multi-dimensional arrays

Java SE8 05: Using Loop Constructs

- Create and use while loops
- Create and use for loops including the enhanced for loop
- Create and use do/while loops
- Compare loop constructs
- Use break and continue

Java SE8 06: Working with Methods and Encapsulation

- Create methods with arguments and return values; including overloaded methods
- Apply the static keyword to methods and fields
- Create and overload constructors; differentiate between default and user-defined constructors
- Apply access modifiers
- Apply encapsulation principles to a class

- Determine the effect upon object references and primitive values when they are passed into methods that change the values

Java SE8 07: Working with Inheritance

- Describe inheritance and its benefits
- Develop code that makes use of polymorphism; develop code that overrides methods; differentiate between the type of a reference and the type of an object
- Determine when casting is necessary
- Use super and this to access objects and constructors
- Use abstract classes and interfaces

Java SE8 08: Handling Exceptions

- Differentiate among checked exceptions, unchecked exceptions, and Errors
- Create a try-catch block and determine how exceptions alter normal program flow
- Describe the advantages of Exception handling
- Create and invoke a method that throws an exception
- Recognize common exception classes (such as NullPointerException, ArithmeticException, ArrayIndexOutOfBoundsException, ClassCastException)

Java SE8 09: Working with Selected classes from the Java API

- Create and manipulate Strings
- Declare and use an ArrayList of a given type
- Write a simple Lambda expression that consumes a Lambda Predicate expression
- Manipulate data using the StringBuilder class and its methods
- Create and manipulate calendar data using classes from java.time.LocalDateTime, time.LocalDate, java.time.LocalTime, java.time.format.DateTimeFormatter, java.time.Period

Java SE8 10: Final Exam

- Completion

Networking

NET 00: Introduction to Networking and Careers

- Completion

NET 01: Network Components Part I

- Describe characteristics of network topology architectures including 2 tier, 3tier, spine-leaf, WAN, SOHO, on-premises, and cloud.
- Compare physical interface and cabling types including single-mode fiber, multimode fiber, copper, ethernet shared media, point-to-point, and PoE concepts.
- Identify interface and cable issues (collisions, errors, mismatch duplex, and/or speed).
- Compare TCP to UDP.
- Explain the role and function of network components including routers, L2 and L3 switches, next-generation firewalls and IPS, access points, controllers, endpoints, and servers.

NET 02: Network Components Part II

- Configure and verify IPv4 addressing and subnetting and describe the need for private IPv4 addressing
- Configure and verify IPv6 addressing and prefix and compare IPv6 address types including global unicast, unique local, link-local, anycast, multicast, and modified EUI 64.
- Verify IP parameters for Client OS (Windows, Mac OS, Linux)
- Describe wireless principles including nonoverlapping WIFI channels, SSID, RF, and encryption and explain virtualization fundamentals (virtual machines)
- Describe switching concepts including MAC learning and aging, frame switching, frame flooding, and MAC address table

NET 03: Network Access

- Configure and verify VLANs (normal range) spanning multiple switches including access ports (data and voice), default VLAN, and connectivity.
- Configure and verify interswitch connectivity including trunk ports, 802.1Q, and native VLAN.
- Configure and verify Layer 2 discovery protocols (Cisco Discovery Protocol and LLDP)
- Configure and verify (Layer 2/Layer 3) EtherChannel (LACP)
- Describe the need for and basic operations of Rapid PVST+ Spanning Tree Protocol and identify basic operations including root port, primary and secondary root bridge, other port names, forwarding/blocking port states, and PortFast benefits.
- Compare Cisco Wireless Architectures and AP modes
- Describe physical infrastructure connections of WLAN components (AP, WLC, access/trunk ports, and LAG)

- Describe AP and WLC management access connections (Telnet, SSH, HTTP, HTTPS, console, and TACACS+/RADIUS)
- Configure the components of a wireless LAN access for client connectivity using GUI only such as WLAN creation, security settings, QoS profiles, and advanced WLAN settings.

NET 04: IP Connectivity

- Interpret the components of a routing table including routing protocol code, prefix, network mask, next hop, administrative distance, metric, and gateway of last resort.
- Determine how a router makes a forwarding decision by default including longest match, administrative distance, and routing protocol metric.
- Configure and verify IPv4 and IPv6 static routing including a default route, network route, host route, and floating static.
- Configure and verify single area OSPFv2 including neighbor adjacencies, point-to-point, broadcast (DR/BDR selection), and Router ID.
- Describe the purpose of first hop redundancy protocol.

NET 05: IP Services

- Describe the use of Syslog features including facilities and levels as well as configure and verify DHCP client and relay.
- Explain the forwarding per-hop behavior (PHB) for QoS such as classification, marking, queuing, congestion, policing, shaping.
- Configure network devices for remote access using SSH and describe the capabilities and function of TFTP/FTP in the network.
- Configure and verify inside source NAT using static and pools as well as NTP operating in a client and server mode.
- Explain the role of DHCP and DNS within the network and the function of SNMP in network operations.

NET 06: Security Fundamentals

- Define key security concepts (threats, vulnerabilities, exploits, and mitigation techniques) and describe security program elements (user awareness, training, and physical access control).
- Configure device access control using local passwords and describe security password policies elements, such as management, complexity, and password alternatives (multifactor authentication, certificates, and biometrics).

- Describe remote access and site-to-site VPNs and configure and verify access control lists.
- Configure Layer 2 security features (DHCP snooping, dynamic ARP inspection, and port security) and differentiate authentication, authorization, and accounting concepts.
- Describe wireless security protocols (WPA, WPA2, and WPA3) and configure WLAN using WPA2 PSK using the GUI.

NET 07: Automation and Programmability

- Explain how automation impacts network management and compare traditional networks with controller-based networking.
- Describe controller-based and software defined architectures (overlay, underlay, and fabric) including separation of control plane and data plane, north-bound, and southbound APIs and compare traditional campus device management with Cisco DNA Center enabled device management.
- Describe characteristics of REST-based APIs (CRUD, HTTP verbs, and data encoding) and recognize the capabilities of configuration management mechanisms Puppet, Chef, and Ansible.
- Interpret JSON encoded data.
- Prepare for the Cisco Certified Network Associate (CCNA) exam.

NET 08: Final Exam

- Completion

Swift App Development

Swift App Development 00

- Completion

Swift App Development 01: Planning, Design, and Theory

- Summarize the steps of the design cycle, including brainstorming, planning, prototyping, and evaluation.
- Summarize how sensitive data can be protected and compromised: Sharing personal and application information
- Summarize how sensitive data can be protected and compromised: Security challenges.
- Evaluate the legal, ethical, and socioeconomic impacts of compromised data.
- Understand the application lifecycle in iOS.

Swift App Development 02: Project Navigation

- Differentiate between basic file types.
- Recognize the assets available in a project.
- Define how assets are used.
- Import an asset to a project and use it correctly.
- Select the appropriate actions to hide or show different areas of the user interface.

Swift App Development 03: Interface Builder/iOS

- Given a scenario, select the appropriate object(s) on the storyboard or the Document Outline
- Use the Attributes inspector to non-programmatically modify the properties of objects and/or a view
- Connect UIKit objects on the storyboard to a Swift file: Differentiate between an IBOutlet and an IBAction
- Connect UIKit objects on the storyboard to a Swift file: Determine when to connect an object as an IBOutlet or an IBAction
- Programmatically modify the properties of objects and/or a view

Swift App Development 04: Functions, Operators, and Structures

- Write, call and/or evaluate the execution of functions: Evaluate the use of argument labels, parameters and returns
- Calculate the results when using various operators
- Create and evaluate structures: Declare the properties of a structure
- Create and evaluate structures: Initialize the properties of a structure
- Create and evaluate structures: Define methods
- Create and evaluate structures: Create an instance of a structure
- Create and evaluate structures: Use an instance of a structure

Swift App Development 05: Arrays

- Create and manipulate arrays: Declare and/or initialize an array with values
- Create and manipulate arrays: Identify and/or modify an array element using its index
- Create and manipulate arrays: Use and/or evaluate array properties and/or methods
- Demonstrate how to control the flow of execution: Create, analyze and predict loop structures and their results
- Demonstrate how to control the flow of execution: Create and interpret the outcome of conditional statements

Swift App Development 06: Enumerations and Naming Conventions

- Create, use and/or compare custom enumerations.
- Declare and/or evaluate constants and variables of different data types: Differentiate between constants and variables.
- Declare and/or evaluate constants and variables of different data types: Apply type inference.
- Declare and/or evaluate constants and variables of different data types: Use explicit typing.
- Use the appropriate naming conventions: Use appropriate camel casing.
- Use the appropriate naming conventions: Apply Swift identifier rules.

Swift App Development 07: Debugging

- Use the Connections inspector to evaluate whether a connection error has occurred.
- Given a connection error scenario, determine a solution.
- Differentiate between syntax and run-time errors when building and running an app.
- Interpret console error messages.
- Recognize the purpose of breakpoints.

Swift App Development 08: Course Wrap-up/Final Exam

- Completion

Swift App Development 09: App Development Project

- Completion

WearTech: Wearable Technologies

WearTech 00: Module 00

- Completion

WearTech 01: Introduction to Wearable and Implantable Technologies

- Define wearable technology and distinguish this from non-wearable technologies
- Define implantable technology
- Describe the history of wearable technologies
- Identify key security and privacy challenges presented by wearable technology
- Discuss whether wearable technology devices isolate or connect people

WearTech 02: Components of Wearables

- Describe the key electronic components that make up nearly all wearables

- Define Moore's law and describe how the reduction in the size of components has contributed to the rise in wearables
- List and describe key sensors used in various wearable applications
- Compare analog and digital sensors
- Examine 3 points of vulnerability in wearable technologies

WearTech 03: Batteries in Wearables

- Describe efficiency and evaluate how technological improvements in other areas help extend battery life
- Examine various battery technologies and describe their characteristics and limitations
- Differentiate between liquid and solid-state batteries
- Define wireless battery charging
- Evaluate the past and current work of John Goodenough, who invented the lithium-ion battery
- Discuss destructive mining from rare metals used in batteries

WearTech 04: Product Design of Wearables

- Describe an operating system and how it is used to integrate components
- Distinguish between hardware and software
- Evaluate key technologies that are part of wearable products, including Artificial intelligence, machine learning, and voice recognition
- Describe the product development process of wearables
- List design considerations that are unique to wearable products, such as durability, reliability safety, and consumer comfort
- Identify potential career opportunities within wearable technology development

WearTech 05: Wearable Technology in Healthcare

- Define key terms related to wearable healthcare technology
- Describe several applications of wearable technology in healthcare
- Evaluate the use of wearable technologies by medical professionals
- Discuss the benefits and potential risks of utilizing and relying on wearable technologies for healthcare monitoring and delivery of care
- Identify potential career opportunities within wearable healthcare technologies

WearTech 06: Wearable Technologies in Fitness and Sports

- Define key terms related to wearable technology in fitness and sports
- Describe applications of wearable technology in fitness and sports

- Evaluate the smartwatch industry and describe various companies and products
- Discuss the benefits and potential risks of utilizing wearable technologies for fitness and sports
- Identify potential career opportunities within wearable fitness/sport technologies

WearTech 07: Wearable Technology in Public Safety and the Military

- Define key terms related to wearable technology in public safety and defense
- Examine several applications of wearable technology by firefighters
- Examine several applications of wearable technology by the military
- Describe the developments and potential uses of exoskeleton technology by the military
- Discuss the benefits and potential risks of having the military utilize wearable technologies
- Evaluate the use of police body cameras in the U.S.

WearTech 08: Wearable Technology in Fashion

- Define key terms related to wearable technology in fashion
- Describe the function of electronic textiles and smart clothing
- Evaluate several applications of wearable technology in fashion and clothing
- Discuss the factors that contribute to a wearable product's success or failure
- Identify potential career opportunities within wearable fashion technologies

WearTech 09: Wearable Technology in Education

- Define key terms related to wearable technology in education
- Describe current and potential applications of wearable technology in education for both students and teachers
- Evaluate the smartwatch industry and describe various companies and products
- Discuss the potential risks and downsides of utilizing wearable technologies for education, such as technical problems, high cost, and cheating
- Examine how wearable technology and AR/VR can contribute to digital distraction and what students can do to increase focus and attention

WearTech 10: Wearable Technology in Business

- Define key terms related to wearable technology in business
- Describe applications of wearable technology in the workforce to improve safety and productivity
- Discuss the benefits and potential risks of utilizing wearable technologies for business

- Discuss standards companies should follow to improve the security and privacy of users
- Identify potential career opportunities within wearable technologies for business

WearTech 11: Course Wrap-up/Final Exam

- Completion

Law, Public Safety, Corrections & Security

ATSVR

ATSVR

VR-01 New User Tutorial

- Learn how to walk in a VR headset
- Learn how to select objects in a VR headset
- Learn how to grab objects in a VR headset
- Learn how to look around in a VR headset

VR-02 Triage Tutorial

- Learn to administer START Triage in a hospital
- Learn how to recognize and tag Minor (green) victims
- Learn how to recognize and tag Delayed (yellow) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Deceased (black) victims
- Learn when and how to use an oral or nasal airway
- Learn when and how to use a tourniquet
- Learn when and how to use a chest seal

VR-03 Active Shooter Mass Casualty Event: Hospital Emergency Preparedness - Beginner

- Learn how to recognize and tag Minimal (green) victims
- Learn to administer SALT Triage in a hospital
- Learn how to recognize and tag Delayed (yellow) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Expectant (grey) victims
- Learn how to recognize and tag Deceased (black) victims
- Learn when and how to treat an obstructed neck

- Learn when and how to use a tourniquet
- Learn when and how to use a chest seal
- Learn when and how to use a decompression needle
- Learn how to use a Bag Valve Mask

VR-04 Active Shooter Mass Casualty Event: Hospital Emergency Preparedness - Intermediate

- Learn how to use a Bag Valve Mask
- Learn when and how to use a decompression needle
- Learn when and how to use a chest seal
- Learn when and how to use a tourniquet
- Learn when and how to treat an obstructed neck
- Learn how to recognize and tag Deceased (black) victims
- Learn how to recognize and tag Expectant (grey) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Delayed (yellow) victims
- Learn to administer SALT Triage in a hospital
- Learn how to recognize and tag Minimal (green) victims

VR-05 Active Shooter Mass Casualty Event: Hospital Emergency Preparedness - Advance

- Learn how to recognize and tag Minimal (green) victims
- Learn to administer SALT Triage in a hospital
- Learn how to recognize and tag Delayed (yellow) victims
- Learn how to recognize and tag Immediate (red) victims
- Learn how to recognize and tag Expectant (grey) victims
- Learn how to recognize and tag Deceased (black) victims
- Learn when and how to treat an obstructed neck
- Learn when and how to use a tourniquet
- Learn when and how to use a chest seal
- Learn when and how to use a decompression needle
- Learn how to use a Bag Valve Mask

VR-06 Mass Casualty Event Reunification Protocol - Beginner

- Learn how to effectively calm panicked children down
- Learn how to manage unaccompanied children after a mass casualty incident
- Learn how to calm children with special needs down

- Learn how to collect information on unaccompanied children
- Learn how to measure a child's weight
- Learn how to measure a child's height
- Learn how to use a brazlo tape
- Learn how to take pictures of children

VR-07 Mass Casualty Event Reunification Protocol - Intermediate

- Learn how to take pictures of children
- Learn how to use a brazlo tape
- Learn how to measure a child's height
- Learn how to measure a child's weight
- Learn how to collect information on unaccompanied children
- Learn how to calm children with special needs down
- Learn how to manage unaccompanied children after a mass casualty incident
- Learn how to effectively calm panicked children down

VR-08 Mass Casualty Event Reunification Protocol - Advance

- Learn how to effectively calm panicked children down
- Learn how to manage unaccompanied children after a mass casualty incident
- Learn how to calm children with special needs down
- Learn how to collect information on unaccompanied children
- Learn how to measure a child's weight
- Learn how to measure a child's height
- Learn how to use a brazlo tape
- Learn how to take pictures of children

VR-09 Vehicle and Machine Training - Explore

- Learn how to enter an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate patient carrying medical equipment within an emergency medical vehicle

- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle
- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle
- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle

VR-10 Vehicle and Machine Training - Beginner

- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle
- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle
- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle
- Learn how to identify and locate patent carrying medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to enter an emergency medical vehicle

VR-11 Vehicle and Machine Training - Intermediate

- Learn how to enter an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate patent carrying medical equipment within an emergency medical vehicle
- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle

- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle
- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle

VR-12 Vehicle and Machine Training - Advance

- Learn how to identify and locate vitals measuring equipment within an emergency medical vehicle
- Learn how to identify and locate pediatric medical equipment within an emergency medical vehicle
- Learn how to identify and locate defibrillation equipment within an emergency medical vehicle
- Learn how to identify and locate patent carrying medical equipment within an emergency medical vehicle
- Learn how to identify and locate wound treating medical equipment within an emergency medical vehicle
- Learn how to identify and locate oral and nasal breathing medical equipment within an emergency medical vehicle
- Learn how to identify and locate wearable medical equipment within an emergency medical vehicle
- Learn how to enter an emergency medical vehicle

Certify ED

Criminal Justice (Video & VR)

Criminal Justice - Unit 01 - The Constitutional Framework of Criminal Justice

- Describe how the three branches of government work in conjunction to support our criminal justice system.
- Identify constitutional law as it applies to the criminal justice system.
- Describe and demonstrate search and Seizure as it relates to Miranda v. Arizona.
- Describe and demonstrate stop and frisk as it relates to Terry v. Ohio.
- Explain how the Bill of Rights governs police and prosecutors.
- Evaluate how the 6th Amendment impacts both criminal investigations and the trial process.
- Evaluate the impact of the 8th amendment on our judicial system.
- Explain how the 14th Amendment enhanced citizen protection under due process.

Criminal Justice - Unit 02 - Criminal Procedure: From Arrest to Prosecution

- Describe arrest procedures including probable cause and reasonable suspicion.
- Describe how to complete an arrest report.
- How to complete correct arrest, place handcuffs, complete a search, and complete an arrest report.
- Define the classes of crimes.
- Define types and categories of misdemeanors crimes and infractions.
- Define types and categories of felony crimes.
- Differentiate between, and identify elements of, civil and criminal law.
- Describe federal criminal law procedures.
- Describe state criminal law procedures.
- Discuss the impact local ordinances can have on criminal procedures.

Criminal Justice - Unit 03 - Federal Courts and the Criminal Justice Process

- Describe the federal court system as it applies to the criminal justice system.
- Describe the roles and responsibilities of the people involved in the trial processes.
- Describe appropriate professional courtroom testimony and demeanor.
- Explain how to notify witnesses and defendants of court schedules.
- Describe the warrant and summons processes.
- Describe the difference between a search warrant and an arrest warrant.
- Identify the programs and agencies within the juvenile justice system and their roles and responsibilities.
- Identify law enforcement procedures related to juvenile delinquency.

Criminal Justice - Unit 04 - Patrol Procedures and Techniques

- Demonstrate proper communication usage and procedures (i.e. use the telephone and police radio properly).
- Demonstrate correctly conducting a low-risk traffic stop, including reporting to dispatch, and issue a traffic citation.
- Describe proper traffic stop techniques.
- Demonstrate proper handcuffing techniques.
- Identify appropriate search procedures in the inspection of a vehicle and equipment.
- Identify appropriate search procedures for persons.
- Identify the main duties and responsibilities of patrol officers.
- Identify different types of patrol procedures and techniques.

- Identify different patrol types and zones and evaluate the advantages and disadvantages of each.

Criminal Justice - Unit 05 - Criminal Investigations: Techniques and Procedures

- Identify the different types of criminal investigations (juvenile, robbery).
- Describe effective interview skills and techniques for obtaining information from witnesses and victims in an investigation.
- Describe effective interview skills and techniques for obtaining information from suspects in an investigation.
- Describe Miranda warning requirements in suspect interviews.
- Describe fingerprint processing, including live scan and inked impressions.
- Describe scene safety techniques for officer response (e.g., domestic abuse, assault).
- Describe scene safety techniques for officer response at a motor vehicle crash site.
- Recognize and describe indicators of impaired drivers.
- Describe the purpose of different types of reports.

Criminal Justice - Unit 06 - Use of Force: Principles, Practices, and Legal Implications

- Describe the use-of-force guidelines as it applies to Federal, State, and local laws.
- Explain the proper de-escalation techniques used by police officers.
- Identify non-lethal weapons and techniques for use in the field.
- Describe the differences between less-than-lethal force and deadly force.
- Identify the procedural laws and requirements governing the use of deadly force.
- Explain the civil and criminal liabilities that apply to use of force by a police office.
- Describe legal issues pertaining to objective reasonableness as it pertains to the use of force that include Tennessee v. Garner and Graham v. Conner cases.
- Demonstrate weapon safety and familiarization.
- Identify the unique interpersonal skills required in communicating with a culturally diverse community.

Criminal Justice - Unit 07 - Human Relations and Community Policing in Criminal Justice

- Identify factors that may affect human relations in criminal justice operations with culturally diverse communities.
- Identify methods of communication that may enhance human relations with culturally diverse communities.
- Describe procedures for identifying, handling, and referring people who exhibit signs of mental illness.

- Identify and describe procedures for dealing with domestic violence, including abuse and neglect.
- Identify racial profiling as it relates to policing.
- Identify solutions for situations that require crisis management and conflict resolution (e.g., language interpreters, victims of domestic violence, homeless persons, disaster response).
- Describe the purpose of different types of reports and field notes.
- Explain the who-what-when-where-why-how elements of accurate report writing and field notes.
- Analyze current trends in effective community-oriented policing.

Criminal Justice - Unit 08 - Law Enforcement Technology and Emerging Threats

- Display familiarity with law enforcement computer databases (i.e. National Crime Information Center (NCIC)).
- Identify emerging police technology and social media.
- Identify sources and types of domestic and international terrorism.
- Describe safe and responsible ways of responding to expressions of hostility or threats, including the use of private security and property protection.
- Identify different types of criminal organizations.

Criminal Justice - Unit 09 - Crime Scene Safety and Hazardous Materials Management

- Discuss the potential health and safety hazards one could encounter at a crime scene.
- Demonstrate skills and techniques to minimize risk to self and others at the crime scene.
- Discuss state and federal regulations regarding hazardous materials as related to crime scenes.
- Identify hazardous materials, proper response, and scene management.
- Discuss emergency procedures involving personal risk in a crime scene situation.
- Demonstrate knowledge of CPR, AED, First aid, and emergency medical care.
- Identify and explain the use of protective equipment for crime scene processing.
- Identify proper methods for marking, measuring, and collecting evidence.
- Explain the scientific principles involved in proper evidence preservation.
- Identify and follow chain of custody protocols.

Criminal Justice - Unit 10 - Crime Scene Investigation and the Juvenile Justice System

- Identify and explain the appropriate crime scene management for a first responder.

- Identify and explain the appropriate search patterns that are used to identify evidence at a crime scene.
- Explain the methods for collecting and processing latent fingerprints.
- Explain the methods for collecting DNA evidence.
- Explain proper crime scene photography and documenting photographs taken at the scene.
- Discuss juvenile court system, including procedures and alternative programs.
- Describe the history of corrections.
- Identify correctional system intake procedures.
- Differentiate between local, state, and federal correctional systems.
- Identify various types of correctional systems security levels, and classifications of correctional institutions.

Criminal Justice - Unit Sim

- Demonstrate visual memory
- Investigate a crime scene
- Understand different techniques used in properly collecting and storing evidence

Open Textbooks

Criminal Justice

CRIMJ02: 01: I. Corrections

- Describe the historical evolution of jails in the United States, from their origins in feudal England to their role as integral components of local criminal justice systems today.
- Understand the diverse population served by jails, including men, women, children, and individuals with mental illness or substance abuse issues. They should also be able to explain the two primary functions of jails: intake and custody.
- Outline the historical development of prisons in the United States, from the early penitentiary movement to the emergence of various correctional models, such as rehabilitation, crime control, and community corrections.
- Understand the classification and security levels within prisons, including super-maximum, maximum, medium, and minimum-security facilities.
- Identify the constitutional rights retained by prisoners in the United States, including the right to free speech, freedom of religion, access to the courts, freedom from retaliation, and protection from cruel and unusual punishment.

- Understand the significance of landmark Supreme Court cases, such as *Wolff v. McDonnell* and *Estelle v. Gamble*, in defining prisoners' due process rights and protections.
- Understand the purpose of parole and probation as community-based sanctions aimed at reintegrating offenders into society as productive members while ensuring community safety.
- Recognize the cost-effective nature of community-based sanctions compared to incarceration and the need for alternative sentencing options for nonviolent offenders.
- Comprehend the due process rights afforded to probationers and parolees, including the requirement for written notice of violations, disclosure of evidence, hearings, confrontation of adverse witnesses, a neutral hearing body, and a written statement of evidence and reasons for revocation.
- Examine the constitutional limitations on probation and parole conditions, including the need for clarity, reasonableness, and a direct relationship to protection and rehabilitation goals, while also considering fundamental rights when imposing conditions.

CRIMJ02: 02: II. Criminal Justice Systems and Processes

- Differentiate between violent and nonviolent crimes and provide examples of each.
- Define hate crimes and explain their historical context in the United States.
- Analyze the prevalence and impact of hate crimes, including their underreporting and specific targets.
- Compare and contrast the Uniform Crime Reports (UCR) and the National Crime Victimization Report (NCVR) in gathering crime data.
- Describe the three branches of the U.S. criminal justice system (police, courts, and corrections) and their respective roles.
- Explain the hierarchy of the U.S. court system, including federal and state courts, and the powers of each branch of government within the system.
- Define dual federalism and explain the theoretical relationship between state and federal governments.
- Discuss the concept of federal supremacy and its impact on state laws in cases of conflict.
- Outline the structure of the U.S. court system, including federal and state courts, and their respective roles.
- Explore the responsibilities and powers of Congress in relation to federal courts, including budget control.

- Explain the supremacy clause and its implications for conflicts between federal and state laws.
- Analyze the interplay between state, federal, and local governments in the criminal justice system and their roles in law enforcement and legislation.
- Understand the distinction between deviance and crime and explain why crime is punishable under official law.
- Evaluate the factors influencing public perception of crime rates and their potential consequences.

CRIMJ02: 03: III. Research Methods & Theories of behavior/punishment

- Understand the importance of the scientific method in sociological research, including its systematic approach, key steps, and its role in ensuring objectivity, accuracy, reliability, and validity in studying human behavior.
- Differentiate between the scientific method and an interpretive framework in sociological research, recognizing that while both approaches provide valuable insights, they have distinct methodologies and goals in studying social phenomena.
- Understand the importance of research methods in sociology and their role in designing and conducting sociological studies.
- Identify and differentiate between the four widely used methods of social investigation in sociology: surveys, field research, experiments, and secondary data analysis, and recognize their strengths and limitations in various research contexts.
- Understand the ethical responsibilities of sociologists in conducting research, including ensuring the safety of participants, obtaining informed consent, and protecting privacy, as outlined by the American Sociological Association's code of ethics
- Recognize the concept of value neutrality in sociological research and its importance in maintaining objectivity, including the obligation to report research findings accurately, even when they conflict with personal beliefs or widely accepted beliefs
- Define and differentiate between various categories of crimes, including felonies, misdemeanors, and violations, and understand the historical origins of this classification in the legal system
- Explain the significance of crime measurement and its role in law enforcement and criminal justice, including the use of crime statistics from sources such as the FBI's Uniform Crime Reports (UCR) and the National Crime Victimization Survey (NCVS), while recognizing the limitations of these data sources

CRIMJ02: 04: IV. Justice and the Law

- Compare the punishment options for felonies, misdemeanors, felony-misdemeanors, and infractions.
- Compare jail and prison.
- Identify the three sources of law.
- Rank the three sources of law, from highest to lowest.
- Ascertain the purpose of the US and state constitutions.
- Ascertain one purpose of statutory law.
- Ascertain the purpose of case law.
- Define judicial review.
- Diagram and explain the components of a case brief.
- Define civil liberties and civil rights
- Describe the origin of civil liberties in the U.S. context
- Identify the key positions on civil liberties taken at the Constitutional Convention
- Explain the Civil War origin of concern that the states should respect civil liberties
- Identify the liberties and rights guaranteed by the first four amendments to the Constitution
- Explain why in practice these rights and liberties are limited
- Explain why interpreting some amendments has been controversial
- Identify the rights of those suspected or accused of criminal activity
- Explain how Supreme Court decisions transformed the rights of the accused
- Explain why the Eighth Amendment is controversial regarding capital punishment
- Describe how the Ninth and Tenth Amendments reflect on our other rights
- Identify the two senses of "right to privacy" embodied in the Constitution
- Explain the controversy over privacy when applied to abortion and same-sex relationships
- Define a crime
- Compare criminal law and criminal procedure
- Compare civil and criminal law.
- Ascertain the primary differences between civil litigation and a criminal prosecution.
- Ascertain the basis for grading.
- Compare malum in se and malum prohibitum crimes.

CRIMJ02: 05: V. Policing

- Describe the historical origins of policing in the United States, tracing its roots back to the common law of England and its early development in colonial America, highlighting the roles of sheriffs and the transition from reactive to proactive policing
- Explain the challenges and reforms in early policing, including issues of political influence, corruption, and the transition to the reform era, emphasizing the contributions of police reformers like August Vollmer and O.W. Wilson in shaping modern policing practices
- Explain the multifaceted role of police officers in society beyond the popularized "crime fighter" image, emphasizing their responsibilities in addressing social service, order maintenance, and other non-law enforcement tasks
- Describe the diverse structure of policing in the United States, including the roles and responsibilities of federal law enforcement agencies, state law enforcement agencies, sheriffs' offices, and local police departments, while also discussing key management styles and the quasi-military features of police organizations
- Describe the historical evolution of police methods in the United States, including the transition from traditional patrol and investigative work to proactive policing strategies, highlighting key research findings that led to this shift
- Explain the concept of proactive policing, including the shift from random preventive patrol to targeted strategies, such as problem-oriented policing and community-oriented policing, and the importance of partnerships, organizational change, and line officer buy-in in implementing these approaches
- Identify the primary responsibilities of criminal investigators, including their roles in gathering information, conducting interviews, managing crime scenes, and developing informants, while recognizing the limitations of traditional investigative methods
- Describe the specialized units within police departments, such as vice, organized crime, internal affairs, and juvenile units, and explain their roles and functions in addressing specific types of crimes and issues within the community
- Understand the distinction between substantive and procedural criminal law and recognize their significance in the criminal justice system.
- Explain the key constitutional amendments (Fourth, Fifth, and Sixth Amendments) and their implications on police conduct, including searches, arrests, interrogations, and the use of force, as well as the concept of Miranda warnings and the exclusionary rule.

CRIMJ02: 06: VI. Courts - Structure and processes

- Compare federal and state courts.

- Define jurisdiction.
- Compare original and appellate jurisdiction.
- Identify the federal courts and determine each court's jurisdiction.
- Identify the state courts and determine each court's jurisdiction.
- Describe the evolving role of the courts since the ratification of the Constitution
- Explain why courts are uniquely situated to protect individual rights
- Recognize how the courts make public policy
- Describe the dual court system and its three tiers
- Explain how you are protected and governed by different U.S. court systems
- Compare the positive and negative aspects of a dual court system
- Describe the differences between the U.S. district courts, circuit courts, and the Supreme Court
- Explain the significance of precedent in the courts' operations
- Describe how judges are selected for their positions
- Analyze the structure and important features of the Supreme Court
- Explain how the Supreme Court selects cases to hear
- Discuss the Supreme Court's processes and procedures
- Describe how the Supreme Court decides cases and issues opinions
- Identify the various influences on the Supreme Court
- Explain how the judiciary is checked by the other branches of government

CRIMJ02: 07: VII. Sentencing

- Compare an inhumane procedure with disproportionate punishment under the Eighth Amendment.
- Identify the most prevalent method of execution pursuant to the death penalty.
- Ascertain crime(s) that merit capital punishment.
- Identify three classifications of criminal defendants who cannot be constitutionally punished by execution.
- Define three-strikes laws, and ascertain if they constitute cruel and unusual punishment pursuant to the Eighth Amendment.
- Ascertain the constitutionality of sentencing enhancements under the Sixth Amendment right to a jury trial.

CRIMJ01: 01: Criminal Justice 100

Criminal Justice 100

- Define the two key models of crime control in the United States, the Consensus Model and the Conflict Model, and differentiate between their underlying principles and assumptions.
- Identify and explain the major tenets of Classical Criminology and Positivism as well as understand the key figures associated with these theories, such as Cesare Beccaria and Cesare Lombroso.
- Explain the evolution of policing from early methods used for controlling certain populations, such as slaves, to the establishment of the first formal police departments, and understand how the patronage system influenced early police recruitment.
- Describe the responsibilities and training requirements for different law enforcement positions, such as U.S. Marshals and FBI Agents, and analyze the key federal law enforcement agencies under the Department of Justice.
- Demonstrate the ability to summarize the key elements of Supreme Court cases, including the facts, constitutional issues, decisions, reasoning, separate opinions, and the impact of the case on future generations.
- Outline the sequential steps involved, including arrest, booking, initial appearance, grand jury, preliminary hearing, indictment, arraignment, plea bargain, trial, and sentencing, and understand the role of bail, pretrial release, and preventive detention in the process.
- Explain the various reasons why society punishes criminals, including concepts like retribution, deterrence, incapacitation, rehabilitation, and restorative justice.
- Describe the different models and structures of sentencing within the correctional system, such as indeterminate sentencing, determinate sentencing, good time, and truth-in-sentencing.

Introduction to Criminal Investigation: Processes, Practices and Thinking

Introduction to Criminal Investigation: Processes, Practices and Thinking

- Understand the critical factors that influence witness credibility in criminal investigations, including the impact of time on memory, the importance of physical abilities and cognitive perception, and the potential challenges posed by truthfully incorrect witnesses

- Gain knowledge of best practices in witness interviews and suspect identification, such as the importance of conducting prompt interviews, the significance of recording and repetitively recounting details, and the protocols for conducting photo and live lineups in law enforcement
- Understand the importance of crime scene management in preserving forensic integrity, including the concepts of contamination control, continuity of evidence, and the originating stages of evidence.
- Learn the essential techniques and considerations for securing, documenting, and collecting physical evidence at crime scenes, including the use of diagrams, exhibit logs, and preventing cross-contamination, while recognizing the varying scales of investigation.
- Identify and explain the key principles and rights outlined in the Canadian Youth Criminal Justice Act (CYCJA), including the rights of youth during police interactions and the requirements for assessing a youth's understanding of their rights
- Demonstrate a clear understanding of ancillary criminal offences, such as conspiracy to commit an offence, attempting to commit an offence, being an accessory after the fact, aiding and abetting, and counselling a person to commit an offence, and be able to differentiate between these legal concepts and their implications in criminal investigations
- Understand the key forensic disciplines and their roles, including forensic entomology, forensic odontology, and forensic engineering, and will be able to explain their significance in crime scene investigations
- Identify and describe the various causes of death, such as laceration, asphyxiation, and toxic substances, and explain how forensic pathologists analyze evidence to determine the cause and manner of death in criminal investigations
- Explain the key principles and limitations of police discretion in Canada, as outlined in the R v Beaudry (2007) ruling, and understand its importance in maintaining a functional criminal justice system
- Distinguish between the legal concepts of arrest and detention in Canada, recognizing the critical differences in the evidence required and the strategic purposes of each action within the context of law enforcement
- Understand the importance of disclosure in the Canadian legal system, including the rights of the accused to access evidence and the role of the crown prosecutor in making disclosure decisions.

- Identify the principles and exceptions related to hearsay evidence, including when it may be admissible in court, such as dying declarations, spontaneous utterances, and statements from child witnesses, while considering the necessity and reliability criteria.
- Understand the concept of "exigent circumstances" in law enforcement, including when and why officers can exercise powers without a warrant, and recognize situations where exigent circumstances apply.
- Develop proficiency in assessing and responding to evolving criminal events, distinguishing between active and inactive events, and knowing when to transition from a Tactical Investigative Response to a Strategic Investigative Response based on the Response Transition Matrix (RTM).
- Understand the key principles of strategic investigative response, including the avoidance of common investigative errors and the importance of collecting, analyzing, and prioritizing evidence effectively.
- Learn the use of the STAIR (Strategic Investigative Response) tool as a structured approach to develop and articulate investigative thinking processes, with a focus on achieving desired investigative results while following established rules and protocols
- Demonstrate the ability to apply the STAIR (Situation, Tasks, Analysis, Investigation, and Results) investigative tool to analyze and develop theories for criminal cases, considering factors such as timelines, spatial relationships, and circumstantial evidence
- Evaluate and validate crime reports by considering evidence that supports the occurrence, timing, location, and modus operandi of a criminal event, leading to the formation of reasonable grounds for further investigation or potential arrest

Introduction to Criminal Justice

ICJ01: Crime, Criminal Justice, and Criminology

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ02: Defining and Measuring Crime and Criminal Justice

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ03: Criminal Law

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance their critical thinking skills via writing, reading, and discussion
- learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ04: Criminal Justice Policy

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Enhance their critical thinking skills via writing, reading, and discussion
- become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ05: Criminological Theory

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system

- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ06: Policing

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ07: Courts

- increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ08: Corrections

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ09: Community Corrections

- Increase the breadth of their knowledge and understanding of the American Criminal Justice System

- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

ICJ10: Juvenile Justice

- Increase the breadth of knowledge and understanding of the American Criminal Justice System
- Enhance critical thinking skills via writing, reading, and discussion
- Learn the history, functions, responsibilities, processes, and importance of each component of the criminal justice system
- Become familiar with research and its relationship to criminal justice policy
- Use the foundations learned about the American criminal justice system in future CCJ courses

Manufacturing

Almon, Inc.

Hydraulics

Basic Hydraulics 1

- Understand hydraulic fundamentals.
- Identify hydraulic components.

Basic Hydraulics 2

- Perform calculations using Pascal's Law.
- Identify tools specific to hydraulic use.

Basic Hydraulics 3

- Analyze symptoms in the least amount of time.
- Analyze symptoms with minimal wasted effort.

Hydraulic Schematic Overview

- Interpret a basic electrical schematic.

- Identify electrical schematic symbols.
- Understand the fundamental purpose and use of a schematic.

Powertrain

Clutch and Brake Steering

- Identify output shaft, steering clutch, input shaft, brake clutch.
- Describe how clutch and brake steering works during a pivot turn and during a gradual steer.

Countershaft Transmission

- Understand how the clutch pack operates.
- Describe transmission controllers, sensors and control valves.
- Understand fundamentals of countershaft transmission power flow.

Diesel Engine Fundamentals

- Identify components of a diesel engine.
- Recognize basic principles of a diesel engine.
- Describe the relationship between components of a diesel engine.

Differential and Axel Fundamentals

- Recognize different types of differentials and axles.
- Identify basic components of differentials and axles.
- Locate components in the assembly.

Gear Fundamentals

- Describe five types of gears.
- Understand how a gear train works.

Planetary Transmissions

- Comprehend how the planetary clutch pack operates.
- Understand fundamentals of a how a modulation clutch operates.
- Describe the transmission power flow process for forward 4th gear.

Tier 4 Emissions

- Understand Tier 4 operation and exhaust management/filtration fundamentals.
- Understand Tier 4 engines as they apply to machines in the construction, agriculture, and outdoor power equipment industries.
- Understand basic exhaust emission requirements and tier ratings.

- Identify common Tier 4 engine components.

Torque Converter Fundamentals

- Describe the three main parts of a torque converter.
- Define the concept of "transfer of rotary motion."

Transmission Fundamentals

- Label the components of a transmission.
- Differentiate transmission types.
- Correlate components with different transmission types.
- Classify transmissions by their method of power transfer.

Tools

Basic Hand Tools

- Examine tools to verify they meet safety standards.
- Select tools based upon the job at hand.
- Differentiate between tools by the features and functionality.

Precision Measuring Tools

- Recognize safety issues involved with precision measuring tools.
- Identify basic precision measuring tools.
- Comprehend various types of precision measuring tools.
- Understand fundamentals of proper use of precision measuring tools.
- Understand proper care techniques for precision measuring tools.

CLX

Automotive Basics

Automatic Transmission: Components and Operation

- Research vehicle and service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
- Check fluid level in a transmission or a transaxle equipped with a dip-stick.
- Check fluid level in a transmission or a transaxle not equipped with a dip-stick.
- Check transmission fluid condition; check for leaks.
- Identify drive train components and configuration.

Automatic Transmission: Maintenance and Adjustment

- Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch.
- Inspect for leakage at external seals, gaskets, and bushings.
- Inspect, replace and/or align powertrain mounts.
- Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification.

Automatic Transmission: Summative Assessment

- nan

Automatic Transmissions: Alternative Transmissions

- Describe the operational characteristics of a continuously variable transmission (CVT).
- Describe the operational characteristics of a hybrid vehicle drive train.

Batteries, Starting, and Charging: Automotive Batteries

- Perform battery state-of-charge test; determine necessary action.
- Confirm proper battery capacity for vehicle application; perform battery capacity and load test: determine needed action.
- Maintain or restore electronic memory functions.
- Inspect and clean battery, fill battery cells, check battery cables, connectors, clamps, and hold-downs.
- Perform slow/fast battery charge according to manufacturer's recommendations.
- Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
- Identify safety precautions for high-voltage systems on electric, hybrid-electric and diesel vehicles.
- Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.
- Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.
- Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins.
- Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

Batteries, Starting, and Charging: Charging Systems

- Perform charging system output test; determine needed action.

- Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.
- Remove, inspect, and/or replace generator (alternator).
- Perform charging circuit voltage drop tests; determine needed action.

Batteries, Starting, and Charging: Starting Systems

- Perform starter current draw tests; determine needed action.
- Perform starter circuit voltage drop tests; determine needed action.
- Inspect and test starter relays and solenoids; determine needed action.
- Remove and install starter in a vehicle.
- Inspect and test switches, connectors, and wires of starter control circuits; perform needed action.
- Demonstrate knowledge of an automatic idle-stop/start-stop system.

Batteries, Starting, and Charging: Summative Assessment

- nan

Brakes: ABS, Traction, and Stability Control Systems

- Identify traction control/vehicle stability control system components.
- Describe the operation of a regenerative braking system.

Brakes: Disc Brakes

- Remove and clean caliper assembly; inspect for leaks and damage/wear; determine needed action.
- Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine needed action.
- Remove, inspect and/or replace brake pads and retaining hardware; determine needed action.
- Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks.
- Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine needed action.
- Remove and reinstall/replace rotor.
- Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.
- Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.

- Retract and re-adjust caliper piston on an integral parking brake system.
- Check brake pad wear indicator; determine needed action.
- Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.

Brakes: Drum Brakes

- Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.
- Refinish brake drum and measure final drum diameter; compare with specifications.
- Remove, clean, inspect and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
- Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
- Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.

Brakes: Hydraulic System

- Describe proper brake pedal height, travel, and feel.
- Check master cylinder for external leaks and proper operation.
- Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear and loose fittings/supports.
- Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification.
- Identify components of hydraulic brakewarning light system.
- Bleed and/or flush brake system.
- Test brake fluid for contamination.

Brakes: Overview

- Identify brake system components and configuration.
- Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
- Describe procedure for performing a road test to check brake system operation; including an anti-lock brake system (ABS).
- Install wheel and torque lug nuts.

Brakes: Power Assist Systems

- Check brake pedal travel with, and without, engine running to verify proper power booster operation.
- Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.

Brakes: Summative Assessment

- nan

Brakes: Wheel Bearings, Parking Brakes, and Brake Lights

- Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
- Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed.
- Check parking brake operation and parking brake indicator light system operation; determine necessary action.
- Check operation of brake stop light system.
- Replace wheel bearing and race.
- Inspect and replace wheel studs.

Drivetrain: Clutch Diagnosis and Repair

- Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification
- Check for hydraulic system leaks.

Drivetrain: Differential Assemblies and Drive Axle Assemblies

- Clean and inspect differential case; check for leaks; inspect housing vent.
- Check and adjust differential case fluid level; use proper fluid type per manufacturer specification.
- Drain and refill differential housing.
- Inspect and replace drive axle wheel studs.

Drivetrain: Driveshafts and Halfshafts

- Inspect, remove, and/or replace bearings, hubs, and seals.
- Inspect, service, and/or replace shafts, yokes, boots, and universal CV joints.
- Inspect locking hubs.

- Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.

Drivetrain: Four-Wheel Drive/All-Wheel Drive Diagnosis and Repair

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Drivetrain: Manual Transmission

- Describe the operational characteristics of an electronically-controlled manual transmission/transaxle.

Drivetrain: Overview

- Research vehicle service information including; fluid type, vehicle service history, service precautions, and technical service bulletins.
- Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification.
- Check fluid condition; check for leaks.
- Identify manual drive train and axle components and configuration.

Drivetrain: Summative Assessment

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Service and Safety: Automotive Technology Careers

- nan

Service and Safety: Cleaners and Lubricants

- nan

Service and Safety: Shop and Personal Safety

- Secure hair and jewelry for lab/shop activities.
- Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
- Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
- Identify and wear appropriate clothing for lab/shop activities.
- Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
- Identify general shop safety rules and procedures.
- Locate and demonstrate knowledge of material safety data sheets (MSDS).

- Identify marked safety areas.
- Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
- Identify the location and use of eye wash stations.
- Identify the location of the posted evacuation routes.
- Utilize safe procedures for handling of tools and equipment.
- Identify and use proper placement of floor jacks and jack stands.
- Identify and use proper procedures for safe lift operation.
- Utilize proper ventilation procedures for working within the lab/shop area.

Service and Safety: Summative Assessment

- nan

Service and Safety: Tools and Equipment

- Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).
- Identify tools and their usage in automotive applications.
- Identify standard and metric designation.
- Demonstrate safe handling and use of appropriate tools.
- Demonstrate proper cleaning, storage, and maintenance of tools and equipment.

Service and Safety: Vehicle Service Preparation

- Identify information needed and the service requested on a repair order.
- Identify purpose and demonstrate proper use of fender covers, mats.
- Demonstrate use of the three C's (concern, cause, and correction).
- Review vehicle service history.
- Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
- Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).

Steering and Suspension: Overview

- Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
- Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.

Steering and Suspension: Steering and Suspension Service

- Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
- Inspect power steering fluid level and condition.
- Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification.
- Inspect for power steering fluid leakage.
- Remove, inspect, replace, and adjust power steering pump drive belt.
- Inspect and replace power steering hoses and fittings.
- Inspect pitman arm, relay (center link/intermediate) rod, idler arm, mountings, and steering linkage damper.
- Inspect tie rod ends (sockets), tie rod sleeves, and clamps.
- Inspect upper and lower control arms, bushings, and shafts.
- Inspect and replace rebound bumpers.
- Inspect track bar, strut rods/radius arms, and related mounts and bushings.
- Inspect upper and lower ball joints (with or without wear indicators).
- Inspect suspension system coil springs and spring insulators (silencers).
- Inspect suspension system torsion bars and mounts.
- Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links.
- Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings.
- Inspect front strut bearing and mount.
- Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.
- Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.
- Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.
- Inspect electric power steering assist system.
- Identify hybrid vehicle power steering system electrical circuits and safety precautions.
- Describe the function of suspension and steering control systems and components, (i.e. active suspension, and stability control).

Steering and Suspension: Summative Assessment

- nan

Steering and Suspension: Wheel Alignment

- Perform pre-alignment inspection; measure vehicle ride height.
- Describe alignment angles (camber, caster and toe).

Steering and Suspension: Wheels and Tires

- Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly.
- Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
- Inspect tire and wheel assembly for air loss; determine needed action.
- Repair tire following vehicle manufacturer approved procedure.
- Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps.
- Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label.
- Rotate tires according to manufacturer's recommendations including vehicles equipped with tire pressure monitoring systems (TPMS).
- Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system, (TPMS) including relearn procedure.

Open Textbooks

Machine Shop Fundamentals

Machine Shop Fundamentals: 01 Measuring Tools

- Explain the proper procedure for preparing an imperial vernier caliper for use
- Use an imperial vernier caliper to take various measurements
- Accurately read the measurement on an imperial vernier caliper
- Identify the Imperial measurement system's notation
- Understand the terminology and decimal places in the Imperial system
- Convert 'thou' to its decimal equivalent. Learners must be able to convert a given number in "thou" (thousands of an inch) to its corresponding decimal value in inches
- Identify the components of an imperial micrometer
- Explain proper use and calibration of an imperial micrometer
- Read an imperial micrometer accurately
- Identify the key parts of an imperial vernier caliper

Machine Shop Fundamentals: 03 Milling Machines

- Understand the importance of practicing safety first when operating milling machines which includes wearing proper PPE, avoiding entanglement hazards, maintaining a clean workspace, keeping hands clear, knowing how to perform a quick shutdown if necessary and being a trained and authorized operator

- Understand that proper operation and setup are crucial for both safety and the accuracy of the work
- Understand machine controls and how to control spindle direction and speed
- Understand how to calculate RPM using the formula $RPM = (Cutting\ Speed \times 4) / \text{diameter of the cutting tool}$ to determine the correct revolutions per minute
- Understand how to change the spindle's speed using the machine's controls, and know that this must be done while the spindle is rotating to prevent belt damage
- Understand how to calculate feedrate by applying the formula $In/min = RPM \times \text{Chip load per tooth} \times \# \text{ of teeth}$ to determine the correct feedrate for the material and tool being used
- Recognize and understand the function of common cutting tools like end mills, face mills, twist drills, center drills, reamers, and taps
- Select the appropriate cutter material, such as high-speed steel (HSS) or carbide, based on the workpiece material and the desired outcome, understanding the trade-off between toughness (HSS) and hardness/speed (carbide)
- Know the correct holder for each tool (e.g., a collet chuck for end mills and a drill chuck for twist drills and reamers)
- Know how to accurately align the milling vice with the X-axis of the machine's table using a dial indicator
- Know how to adjust the milling head so it is perfectly perpendicular (90 degrees) to the work table
- Understand the process of squaring a block
- Know how to use parallels to raise the workpiece above the vise jaws
- Understand the importance of tapping the workpiece down while tightening the vise
- Understand how to execute the correct sequence for squaring a block
- Know to deburr all edges of the workpiece after each cut
- Know how to accurately locate a position using an edge finder
- Understand the Edge Finder's function
- Understand the importance of using a collet chuck to hold the edge finder
- Know how to use the edge finder to locate the center of a workpiece
- Understand how to execute drilling and tapping Procedures
- Know the correct sequence for creating a threaded hole
- Know how to set and achieve the correct drilling depth, whether by using a DRO (digital readout), a graduated dial, or by marking the drill bit with a visual guide like a caliper or tape

- Understand the process for hand-tapping a hole

Machine Shop Fundamentals: 02 Engine Lathes

- Recognize that all actions involving a lathe must prioritize safety. This includes wearing proper PPE, removing entanglement hazards, maintaining a clear workspace, performing pre-operational checks, being able to immediately identify and use the correct emergency stop mechanism for the specific machine and being properly trained and authorized to operate a lathe
- Understand the importance of setting the correct Revolutions per Minute (RPM) and how to do so
- Understand and be able to use this formula: $\text{RPM} = (\text{Cutting Speed} \times 4) / \text{Diameter of the workpiece}$
- Define Feed Rate, know how to set it and understand the difference between roughing and finishing operations and how the feed rate changes for each
- Identify and know the purpose of various lathe tools
- Understand the importance of centering and learn the proper method for adjusting a tool's center height
- Be able to identify and use the main controls on a lathe
- Understand how to engage the feed levers on the machine's apron to control the movement of the carriage for turning (longitudinal movement) and the cross-slide for facing (transverse movement)
- Know how to use the handwheels to manually control the movement of the carriage (length) and cross-slide (diameter)
- Understand the importance of planning the sequence of cuts for a project
- Know how to select the right material stock for a project
- Know how to properly secure the workpiece in the chuck
- Understand the technique of facing
- Understand outside diameter (OD) turning
- Learn the purpose of center drilling
- Understand the purpose of knurling
- Understand OD turning to shoulders
- Know how to use trigonometry to calculate the correct angle for a taper
- Understand how a telescoping taper attachment works
- Learn the procedure for making a taper cut
- Learn how to cut external threads using a die and die stock

- Understand the importance of creating a smooth surface finish and safely breaking sharp edges
- Understand the procedure for parting off the finished workpiece from the stock
- Learn how to turn multiple diameters and cut grooves on a workpiece
- Understand how to use the compound rest to cut complex shapes
- Recognize the importance of laying out a part before machining

Machine Shop VESL

Machine Shop VESL: 06 Blueprint Reading

- Identify common lines used in mechanical prints
- Identify views on mechanical prints
- Identify the purpose of mechanical prints
- Identify isometric drawings
- Identify orthographic drawings
- Locate and read information in the title box
- Locate and read information in revision box

Machine Shop VESL: 08 The Milling Machines

- Differentiate between lathe and milling machine functions
- Identify the two main types of milling machines
- Identify and understand the main parts of a milling machine
- Understand and operate the main controls and understand the distinction between manual and automatic feed controls, the controls for vertical feed, table feed (longitudinal movement), cross feed, the ON/OFF switch and speed-change dial
- Identify different types of arbor-mounted cutters
- Differentiate between adapter and shank-type milling cutters
- Identify the different kinds of shank-type cutters and their uses
- Understand and differentiate between conventional and climb milling

Machine Shop VESL: 01 Machinists and Career Paths

- Identify different career pathways in the metalworking trade
- Define the role of a machinist
- Understand the importance of machinists

Machine Shop VESL: 02 Safety in the Machine Shop

- Understand the importance of a safety-first attitude

- Identify and prevent unsafe conditions and practices
- Understand proper safety precautions for working with machines and tools
- Know what to wear for protection on the job
- Recognize common causes of accidents and how to avoid them

Machine Shop VESL: 03 Hand Tools and Bench Tools

- Recognize the different kinds of pliers
- Understand essential techniques for using tools
- Identify and understand the purpose of common hand and power tools
- Know key vocabulary words like portable, swivel, fastener
- Utilize reading techniques like reading for details
- Identify the purpose of hand tools
- Understand how to use wrenches and sockets
- Understand the function of taps and dies
- Differentiate between hand tools and power tools
- Know the uses of hammers, chisels, and punches

Machine Shop VESL: 04 Basic Math

- Differentiate between fractional and decimal inches
- Understand the concept of tolerance and its importance in manufacturing
- Apply basic geometric principles to angles and their measurement
- Apply mathematical formulas to solve problems related to triangles and circles, which are fundamental geometric shapes in machine shop work
- Understand the functions of the TI30xs calculator

Machine Shop VESL: 05 Precision Measurement

- Say and write the correct name for many important measuring instruments
- Find the correct measuring instrument when you hear its name or see it in writing
- Explain the purpose of each measuring instrument
- Ask for measuring instruments that you need
- Follow directions for the use of measuring instruments with practice on some real tools
- Understand the mathematical terms required to use measuring instruments and be able to make calculations needed to use these tools effectively

Machine Shop VESL: 07 The Engine Lathe

- Identify and understand the purpose of a lathe

- Understand the main parts of a lathe and their functions
- Understand the concepts of speed, feed, and depth of cut
- Understand how to prioritize lathe safety and safe operating procedures
- Identify and describe common lathe accessories and their functions
- Understand and differentiate between common lathe operations

Machine Shop VESL: 09 The Drill Presses and Grinders

- Identify and describe the main types of drill presses
- Understand and identify the primary drill press operations
- Differentiate between the main types and functions of grinders
- Understand key grinding wheel maintenance and safety practices
- Understand the purpose and key components of a cylindrical grinder

Support for CNC

CNC00: Introduction to Computer Numerical Control (CNC)

- Dry run
- Safely run a new CNC program.
- identify backlash mechanism (the ball screw) in CNC machines
- Set Part Offsets.
- Load a CNC program into the machine control.
- Adjust offsets to account for tool wear and deflection.
- Shut down a CNC machine correctly.
- Describe Letter Address Commands
- Identify the motions of a CNC machine
- Discuss the motions of a CNC machine
- understand mechanical backlash in machine operation
- Identify purpose of the control panel on a CNC machine
- Identify information displayed on digital readout panel
- Identify six things a CNC operator needs to know
- Define critical dimensions
- Understand importance of condition of the cutters
- Identify tool numbers
- Understand importance of surface finishes
- Understand the CNC Operation.
- List the steps to set up and operate a CNC mill.

- Identify the location and purpose of the operating controls on the Haas CNC Mill control.
- Start and home a CNC machine.
- Load tools into tool carousel.
- Set Tool Length Offsets.

CNC01: Lesson 1 IMTL-136 Workbook

- Identify the program's list instructions.
- Understand the Program Format
- Understand the G & M Codes.
- recognize tool numbers
- understand code to change tool
- calculate the spindle speed RPM for milling
- turn on a spindle in the proper direction
- Identify G54-G59 codes for specific workpiece locations on the table
- Describe importance of matching G54-G59 codes with work offset registry.

CNC02: Lesson 2 IMTL-136 Workbook

- Identify the difference between linear and linear interpolated machine moves
- Describe the difference with Z0 machine home versus Z0 on the part.
- Describe Best Practices for setting Z axis cutting depths.
- identify Tool Length Offsets
- identify Tool Height Offset Compensation
- recognize Tool Length Offset register
- identify CNC codes for turning coolant on and off

CNC03: Lesson 3 IMTL-136 Workbook

- recognize rapid position motion
- identify why rapid positioning motion is used
- recognize linear interpolation motion
- identify why linear interpolation motion is used
- identify the Cartesian Coordinate system
- identify how the coordinates are expressed in CNC programs
- Identify the four quadrants of the coordinate system
- identify CNC codes for turning coolant on and off
- identify incremental movements

- identify modal commands
- recognize the reference for origin in CNC codes

CNC04: Lesson 4 IMTL-136 Workbook

- identify CNC machine coordinates
- recognize where Machine Home is located
- identify when to command stop for the spindle
- recognize the difference in different types of machine stops
- calculate feed rates

CNC05: Lesson 5 IMTL-136 Workbook

- Use four questions to write a code to cut an arc
- find the center of an arc
- measure to the center
- write a CNC code to cut an arc

CNC06: Lesson 6 IMTL-136 Workbook

- identify the reasons for using cutter compensation
- choose between G41 and G42 in CNC code
- identify the best practices for using Cutter Compensation commands
- understand the purpose for a Lead In
- describe the movement of Lead In

CNC07: Lesson 7: IMTL-153 Mills

- Identify and describe a canned cycle for CNC code
- Identify basic functions within a canned cycle
- Identify and describe two types of R-planes used in CNC codes
- Identify the purpose of G98 and G99 CNC codes
- Identify and describe G81 Drill Canned Cycle for CNC code
- Identify and describe G80 Cancel Canned Cycle
- Identify Z-depth for a center drill
- Calculate Z-axis (part thickness + radius of drill) for thru holes
- Write a three-part CNC program using G81 canned cycle code
- Identify a deep hole
- Identify and describe G83 Multi-Peck Drill Canned Cycle
- Identify and describe the G83 variables of I, J, and K

- Calculate the values for I, J, and K
- Calculate Speed and Feed reductions for use with deep holes
- Identify and describe G84 Tapping Canned Cycle
- Locate notes for tapping speed reductions on CNC Speed and Feed chart
- Find the appropriate drill size for a hole
- Calculate the feed rate for G84
- Identify and describe an address in CNC Code
- Identify and describe a word in CNC Code
- Identify and describe an argument in CNC Code
- Identify and describe a block in CNC Code
- Identify and describe a line number in CNC Code

CNC08: Lesson 8: IMTL-153 Turning Machines

- Identify and describe parameters on CNC turning center (lathe)
- Identify and describe U and W with G02/G03 blocks
- Identify and describe G02 and G03 on a CNC turning center
- Identify and describe I and K-Method for arcs on a CNC turning center
- Define G96 Constant Surface Speed (CSS)
- Describe the purpose of G96 CSS
- Identify and Describe G50
- Describe nub removal
- Identify and describe G71 Roughing Cycle variables
- Identify and use N words within P and Q variables in G71
- Identify finish allowance
- Apply finish allowance to U and W words in G71
- Identify and describe G76 Threading Cycle
- Calculate for K word used in G76
- Calculate for D word used in G76
- Selection number of passes for N word in G76

CNC09: Lesson 9: HAAS

- Identify the Haas Control.
- Identify the Keyboard.
- Describe Start/Home Machine procedure.
- Describe Door Override procedure.

- Describe Load Tools procedure.
- Describe Tool Length Offset (TLO) for each tool.
- Verify part zero offset(XY) using MDI.
- Describe the setting tool offset.
- Verify Tool Length offset using MDI.
- Describe the procedure of load CNC program.
- Describe the procedure of save CNC program.
- Explain how to run CNC program.
- Describe the use of cutter diameter compensation.
- Describe the shut down program.

CNC10: References

- Completion

TPC

331 Bulk-Handling Conveyors

331 Bulk-Handling Conveyors

- Explain the function and operation of the following emergency controls: electrical interlocks, backstops, level switches, pull-chords, and conveyor belt alignment switches.
- Name at least five safety measures employees should take to protect themselves when working on or near bulk-handling conveyors.
- Describe the three-step procedure for preventing accidental startup of a conveyor during maintenance work.
- Name at least one specific chore or safety caution required in maintenance work on each of the following: belts, idlers, pulleys, and drive systems.
- Identify common problems (and their probable causes) found in troubleshooting idlers, pulleys, take up bearings, and conveyor drives.
- Point out the special hazards for workers at conveyor loading and discharge points.
- Describe the basic operation of a bulk-handling belt conveyor and identify its major components.
- State correct storage and handling procedures for bulk conveyor belts.
- Explain the purpose and the operation of at least four of the support components of a bulk-handling belt conveyor.

- Describe the composition and structure of the three components of a bulk-handling conveyor belt.
- Name and explain the function of the different pulleys used in belt conveyors.
- Describe four popular conveyor drive-package arrangements.
- Explain how devices such as wing pulleys, self-cleaning return idlers, and deck plates function as parts of a belt cleaning system.
- Name the five points that require special attention in a preventive maintenance program for a belt conveyor system.
- Name and describe the different types of blade belt cleaners.
- Describe the design and placement of blade, brush, and plow belt cleaners and the applications for which each one would be used.
- Detail the installation of a belt in a bulk conveyor system, including splicing and tensioning.
- Differentiate between a deadbed and a bed of fines and detail the use of both in chute loading of conveyors.
- Name and explain the operation of three special types of discharge spouts
- Differentiate between a conveyor profile and a system profile.
- Describe the appropriate safety precautions to take when installing or maintaining belt cleaners.
- List the essential features of preventive maintenance and inspection for a belt cleaning system.
- Explain two important factors in efficient conveyor loading and how they are affected by the two ways (directions) in which belt conveyors are loaded.
- Describe the construction and the purpose of skirtboards.
- Describe the process of belt cleaning by rollover.

501 Introduction to Industrial Robotics

501 Introduction to Robotics

- Identify why robots did not appear in large numbers in manufacturing until the late 1970s.
- State the Robot Industries Association's definition of an industrial robot and explain the two key words.
- Describe how industrial robots are used in batch production systems.
- Explain how industrial robots are used in repetitive manufacturing systems that utilize transfer lines.

- List at least three factors that should be considered as part of a risk assessment when a robot system is in the development stage.
- Describe and contrast the following guarding methods: barrier, presence-sensing device, awareness device, warning system.
- Define the term zero-energy state.
- Name and describe the basic building blocks of an industrial robot.
- Name and describe the additional components that make up a robot system.
- Define the following robot terms: degrees of freedom, position axes, orientation axes, work envelope, tool center point.
- Define and give an example of the following specifications for industrial robots: payload, repeatability, memory capacity, and environmental requirements.
- Identify the basic path-control techniques and describe their characteristics.
- List the two types of interfaces and three groups of sensors used in industrial robot systems.
- Describe the primary simple contact sensor commonly found in robot systems.
- Identify and explain the operation of the two simple noncontact sensors most often used in industrial robot installations.
- Explain the difference between the simple sensor interface and complex sensor interface.
- Identify and describe vision and tactile sensors and the systems required to support them.
- Name the five general requirements all tooling must satisfy.
- Identify and describe briefly the four basic tooling power sources.
- Describe the five categories of end-of-arm tooling used in robot applications.
- List and describe the four basic functions of the computer(s) controlling an automated work cell.
- Explain the function and advantages of a quick-change device.
- Define the term compliance and explain why it is important.
- Explain the difference between accuracy and repeatability in robots.
- Identify the five methods of classifying industrial robots.
- Explain the difference between robots with closed-loop control and those with openloop control.
- Describe the techniques used in closed- and open-loop control in robot systems.
- List the advantages and disadvantages of open-and closed-loop control in robot systems.

- Distinguish between assembly and nonassembly robots according to the application for which they were designed.
- Classify robots by arm geometry, power source, and path control techniques.
- Identify the basic robot work envelopes and name the arm geometries that produce them.
- Name the basic power sources used for robot motion and give an advantage and disadvantage of each.
- Name the two major types of robot programming and give advantages and disadvantages of each.
- Name and describe two basic methods of teach programming and tell when each is used.
- List three advantages of off-line programming.
- Name the two elements of a computer program for off-line robot programming.
- Explain the basics of ladder logic programming.

TPC Air Conditioning & Refrigeration Training

431 The Refrigeration Cycle

- Tell what it means to evacuate a refrigeration system and tell how it is done.
- List and describe at least three methods of leak detection.
- Explain the construction of a sling psychrometer and tell how and why it is used.
- Name the instrument used to measure relative humidity.
- Define specific humidity and relative humidity.
- Define enthalpy and explain how it is calculated.
- Demonstrate how to use the psychrometric chart to determine dewpoint temperature, specific humidity, relative humidity, and enthalpy.
- Describe a gauge manifold and tell how it is used.
- Explain the function of the refrigerant in a refrigeration system and trace its path.
- Contrast dry-expansion and flooded evaporators.
- Name the five main types of compressors.
- Define cooling medium and name the two most commonly used.
- Explain the operation of the six most common metering devices.
- State the definition of psychrometrics.
- List the four air properties important in psychrometrics.
- Differentiate between dry- and wet-bulb temperature and tell how each is measured.
- Define the term saturated air.

- Define refrigeration and air conditioning and explain how they differ.
- Describe the two methods of lowering the temperature of a material.
- Name the three physical states of matter.
- Identify what causes matter to change its state.
- Explain the difference between sensible and latent heat.
- Compare the Fahrenheit and Celsius temperature scales and convert temperatures from one to another.
- Name and describe the three methods of heat transfer.
- Define latent heat of fusion and latent heat of vaporization.
- Explain the difference between absolute pressure and gauge pressure.
- Describe the effect of pressure changes on boiling point.
- Explain the function of each of the major refrigeration system components: evaporator, compressor, condenser, and metering device.
- Define the terms subcooling and superheating.
- Name the instrument used to measure each of the following electrical values: potential difference, current, resistance, and electric power.
- List the four classes of work area hazards, and give an example of each.

432 Refrigerants and Refrigerant Oils

- Explain the ASHRAE standard for refrigeration identification.
- Discuss in detail some common refrigerants in use today, their advantages, disadvantages, characteristics, and applications.
- Calculate the compression ratio, refrigerating effect, refrigerant flow rate, heat of compression, compressor horsepower, and coefficient of performance for a system.
- Determine compressor discharge temperature, compressor volume displacement, superheat, subcooling, and total heat rejection in the condenser, using a P-H diagram.
- Explain the purpose and methods of liquid subcooling.
- Identify several properties of the ideal refrigerant.
- Use a P-H diagram to show the process of evaporation, compression, condensation, and liquid metering.
- Define the term enthalpy, and differentiate between the enthalpy of saturated liquid, the enthalpy of evaporation, and the enthalpy of saturated vapor.
- Explain the relationship between pressure and boiling point in a liquid.
- Contrast active and passive recovery equipment.
- Define the three types of refrigerant releases permitted by EPA regulations.

- List the reports you should keep concerning refrigerant purchase and use.
- Name the two broad categories of oils and the sub-categories of each.
- Explain how oil becomes mixed with the refrigerant and the problems its presence can cause in a refrigeration system.
- Describe the function of an oil separator.
- List several problems that can be caused by water in a refrigeration system.
- Describe the procedures for checking oil level and adding or removing oil.
- Define the terms blend, fractionation, temperature glide, and azeotrope.
- Describe how refrigerants are classified for safety purposes.
- Explain the safety precautions that must be taken when handling and storing refrigerants.
- Define ozone and tell why it is important.
- Explain how CFCs deplete the ozone layer and contribute to the greenhouse effect.
- Explain how refrigeration system servicing procedures have changed in response to the discovery of ozone depletion.
- Name the "three Rs" and define each term.
- Identify several ways in which good installation practices can prevent refrigerant leaks.
- Name some of the steps being taken by the United States government to control the depletion of stratospheric ozone.
- List the five main elements of the EPA regulations concerning recycling, emission reduction, and disposal.
- List the contaminants that can infiltrate or form within a refrigeration system.
- Describe the various types of filters, driers, filter-driers, and strainers used in mechanical refrigeration systems.
- Distinguish between absorption-type and adsorption-type desiccants.
- Explain the importance of proper location when installing filters, filter-driers, and strainers.
- List the important factors to consider when selecting a filter-drier.
- List several safety precautions to follow when working with filter-driers.
- Describe the various methods of locating leaks in a refrigeration system.
- Explain how to connect a gauge manifold to a system and how to remove air from the manifold.
- Explain how to check the refrigerant charge in a system.
- Name and describe the two methods of evacuating and dehydrating a refrigeration system.

- Describe the procedures for vapor charging and liquid charging a system.
- Identify and explain the various methods of adding the correct amount of refrigerant to a system.
- Contrast active and passive refrigerant recovery.
- Explain the purposes oil serves in a refrigeration system.
- Define the following properties of oil: stability, viscosity, miscibility, floc point, and flash point.
- Explain the levels of technician certification.

433 Compressors

- Describe the operating principle of a kinetic-displacement compressor.
- List advantages and disadvantages of centrifugal compressors as compared to positive displacement types.
- Describe the operation of the single-screw and twin-screw helical compressor.
- Describe the operation of a scroll compressor.
- Explain reverse hydrostatic sealing.
- Explain how centrifugal compressors deal with thrust forces.
- Trace the operation of a typical centrifugal compressor lubrication system.
- Tell the purpose of a purge system.
- Describe the capacity control methods used in centrifugal compressors.
- Explain the basic requirements of a compressor motor.
- Name the different types of single-phase and three-phase motors used to power compressors and tell which ones can be used in hermetic compressors.
- Explain how to reverse the direction of rotation of a motor.
- Explain how to change voltages on a dual-voltage motor.
- Describe the operation of the current and potential relays used for starting single-phase hermetic compressor motors.
- Name the two basic categories of motor-starting devices and tell how each operates.
- Explain the function of a reduced-voltage starter and name the five kinds used with compressor motors.
- Describe the three kinds of motor overload protection commonly used with compressor motors.
- Discuss the causes of, effects of, and solutions for high discharge pressure, low suction pressure, and low oil pressure.
- Explain the function of a suction-line accumulator.

- Explain why crankcase heaters are sometimes necessary.
- Explain how heat exchangers improve the performance of a compressor.
- State the first rule of preventive maintenance for compressors and related components.
- List preventive maintenance procedures common to most compressors.
- Explain how to calculate voltage imbalance in a three-phase motor.
- Name at least three possible causes of a low compressor oil level.
- Describe motor spot burnouts and cookouts, list their possible causes, and explain how to determine the severity of a burnout.
- Explain how to clean up a system after a motor burnout.
- Describe compressor disassembly, cleaning, inspection, and reassembly procedures.
- Name at least three possible causes of compressor overheating.
- Explain how electrical problems can cause various system malfunctions.
- Explain how to pump down a compressor for repairs.
- List important considerations in compressor replacement.
- Describe the general construction of open, semi-hermetic, and full-hermetic reciprocating compressors.
- Explain how the basic parts of a reciprocating compressor are assembled.
- Identify common designs of housings, pistons, connecting rods, crankshafts, bearings, seals, cylinder heads, and valves used in reciprocating compressors.
- Explain how a cylinder unloader controls the capacity of a reciprocating compressor.
- Explain how compressors are lubricated.
- Explain how compressor vibration and noise are controlled.
- Describe the operation of single-vane and multiple-vane rotary compressors, including how each raises refrigerant pressure.
- List several advantages of rotary compressors over reciprocating compressors.
- Define slugging and cavitation.
- Tell the two functions of an accumulator in a rotary compressor.
- Compare and contrast rotary and helical compressors.
- Contrast the operation of positive-displacement and kinetic-displacement compressors.
- Explain how each kind of the five kinds of compressor raises the pressure of the refrigerant vapor.
- List the five kinds of air conditioning and refrigeration compressors.
- Define staging and cascading and explain why each is used.

434 Evaporators and Metering Devices

- Explain the function of the evaporator in a refrigeration system.
- List five main factors affecting evaporator capacity, and explain how each can be optimized to gain the greatest possible evaporator capacity.
- Describe the basic evaporator configurations.
- Explain the function of headers and distributors in multiple-circuit evaporators.
- Explain how comfort coolers reduce both air temperature and humidity.
- Compare and contrast dry-expansion and flooded evaporators.
- List the main types of flooded evaporators.
- Explain the process of secondary refrigeration.
- Define eutectic solution and eutectic temperature.
- Describe three types of multiple-evaporator systems.
- Identify cascade and multiple-staging refrigeration systems.
- Explain how the laws of thermodynamics apply to refrigeration.
- Describe how to increase the net refrigerating effect of an evaporator.
- Demonstrate—using simple arithmetic—the amount of increase in net refrigerating effect caused by subcooling.
- List several advantages of using a heat exchanger in a refrigeration system.
- Describe three ways of keeping oil out of an evaporator.
- Explain why the circulation of air or water through an evaporator coil improves evaporator performance.
- Explain why periodic defrosting of evaporator coils is necessary.
- List and describe at least five different methods of defrosting an evaporator.
- Explain the differences between the hot-gas and reverse-cycle defrost methods.
- Explain how to clean an evaporator coil, drain pan, and drain line.
- Describe how to remove rust, scale, and sludge from shell-and-tube evaporators.
- List two ways evaporator coils can be winterized.
- Tell how low airflow and excessive moisture increase frost buildup on coil surfaces.
- Explain how dirty coils and damaged fins reduce an evaporator's cooling capacity.
- Explain the primary function of a metering device.
- Name the five main types of expansion valve, and describe the operation of each.
- Contrast the operation of an internally equalized and an externally equalized TXV.
- Explain how to adjust the superheat on a TXV.
- Describe the structure, operation, and application of high- and low-side float valves.

- Identify three causes of floodback and describe the corrective action for each.
- List the common problems of TXVs along with their solutions.

435 Condensers and Cooling Towers

- Contrast the two types of air-cooled condensers—natural draft and forced air.
- Describe the construction of an air-cooled condenser, including the tubes, fins, headers, and subcooling circuit.
- Name the factors that affect condenser capacity.
- Explain the effects of ambient temperature on the capacity of an air-cooled condenser.
- Describe various types of low-ambient controls for air-cooled condensers.
- Explain how spring-loaded pressure-relief valves and fusible plugs protect against possible explosions caused by high pressure.
- List the periodic maintenance procedures common to most air-cooled condensers.
- Name and describe the basic types of water systems used by water-cooled condensers.
- Define the terms makeup water and fouling factor.
- Describe the construction of the various kinds of water-cooled condensers.
- Explain the purpose of the accessories used with water-cooled condensers—pressure relief devices, water-regulating valves, and strainers.
- Explain water-cooled condenser maintenance procedures, including inspection for leaks and chemical and mechanical cleaning.
- Explain the function of cooling towers and spray ponds and the factors that affect their capacities.
- Identify the basic types and construction of cooling towers and spray ponds.
- Describe the components required in a cooling-tower or spray-pond water-circulating system and explain the purpose of each.
- Describe the various devices used to control cooling-tower capacity.
- Explain cooling-tower and spray-pond maintenance procedures.
- Identify the basic types of evaporative condensers.
- Describe the components that make up the three circulation systems in an evaporative condenser—refrigerant, air, and water—and explain the operation of each.
- List the kinds of capacity controls used on evaporative condensers and explain the operation of each.
- Explain how to provide freeze protection for an evaporative condenser.
- Outline evaporative-condenser maintenance procedures.

- Describe the three categories of water problems encountered in the water systems of water-cooled equipment.
- Name the five causes of corrosion and explain how to control them.
- Describe the three most common types of scale, their causes, and how to control them.
- List the three types of organisms that grow in water systems and explain how to control them.
- Describe the three types of wood deterioration and explain how to control them.
- Explain the operation of three chemical-feeding devices used in water systems.

436 Piping

- Explain the importance of thermal insulation for refrigeration system piping.
- Define corrosion and explain how it can be prevented in refrigerant and water piping.
- Name three methods of joining steel pipe.
- Explain how tubing is cut, flared, bent, and joined.
- Describe the step-by-step procedure for making a brazed joint.
- Name the three main lines of piping in a refrigeration system.
- Explain why air conditioning and refrigeration piping must be sized correctly.
- Contrast pipe and tubing and explain why tubing is often preferred over piping.
- Explain how pipe is classified according to schedule.
- Explain how a double suction riser moves oil along with the refrigerant.
- Explain why suction lines are pitched down toward the compressor.
- Explain the function of an accumulator and a heat exchanger in a suction line.
- Describe the basic differences between evaporator-pressure regulators and crankcase pressure regulators.
- Describe the various ways of supporting horizontal and vertical pipe runs.
- Describe the damage that can be caused by vibration and tell how to protect piping from it.
- Explain why it is necessary to insulate the suction line.
- Explain how a suction line for multiple compressors differs from a suction line for a single compressor.
- Name at least four factors that cause piping problems and can lead to operating problems.
- Explain why cleanliness is essential when assembling refrigeration piping.
- Name at least three ways to allow for the expansion of piping.

- Name and explain the purposes of three discharge-line accessories.
- Name the functions of the liquidline.
- Explain why it is desirable to have subcooling in the liquid line.
- Describe the effects of pressure drop in the liquid line on the operation of a refrigerant system.
- Describe the effects of flash gas formation on the performance of the system.
- State the flow velocity needed for refrigerant vapor to entrain oil in horizontal piping and in vertical risers.
- Name some practical steps you can take to assure a good flow of refrigerant in horizontal piping.
- List the four functions of the discharge line in a refrigeration piping system.
- Explain the importance of pressure drop in piping and its effects on system operation.
- Define the term entrainment and explain why entrainment of oil is important.
- Describe the functions of the suction line, its structural demands, and special design features.
- Describe ways of preventing refrigerant and oil migration to the compressor.
- Explain the purpose of a liquid receiver.
- Explain why each of the following devices is used in the liquid line: sight glass, solenoid valve, check valve.

437 Control Systems

- Explain why control systems are needed and name devices used to control environmental conditions.
- Define the terms used to describe control systems—controlled variable, controller, controlled device, setpoint, control point, and controlled medium—and name the basic elements of a control system.
- Describe the action of two-position, floating, and proportional control.
- Explain how anticipators work.
- Compare open-loop and closed-loop control.
- Compare the basic requirements of pneumatic/hydraulic control systems to those of electric/electronic control systems.
- Explain the need for a sensor in a control system.
- Name and explain the operation of three kinds of temperature sensors.
- Define relative humidity, state the range required for human comfort, and describe common humidity sensors.

- Name three common pressure sensors and explain their operation.
- Explain the operation of two-position dampers and valves in shutoff and throttling applications.
- List the advantages of variable-speed drives over older methods of speed control.
- Describe the operation of two-position, floating, and proportional electric controllers.
- List the equipment needed for a pneumatic control system.
- Name several pneumatic relays and switches, and explain why each is used.
- Discuss the advantages and basic operation of electronic controls.
- Define resolution, sensitivity, proportional band, and gain, and explain how they are related.
- Distinguish between integral and derivative action, and explain how each can improve system performance.
- Explain how pump down control operates and why pump down is often preferred over other methods of primary control.
- Describe the location, function, and operation of a high-pressure control.
- Name three ways to control condenser pressure and at least three ways to control system capacity.
- Explain how a differential oil pressure safety control works.
- Compare the two methods of modulating the flow of water to hydronic terminals.
- List the four basic steps involved in setting up a PM program.
- Explain the importance of high-pressure controls as safety devices and explain their testing procedures.
- Explain how oil pressure is maintained in various kinds of compressors.
- Describe the testing and maintenance required for condenser water regulating valves and compressor capacity controls.
- Explain how to check for oil and water contamination in control air and what measures to take to minimize them.
- Explain the major maintenance requirements of a pneumatic control system.
- Describe the maintenance required by electric and electronic controllers.
- Explain how to use a troubleshooting chart.

438 Air Handling Systems

- Explain the operation of electronic air cleaners and tell how they are serviced.
- Explain the function of an air filter.
- Describe the two main types of mechanical air filters.

- Explain how to establish a service schedule for air filters.
- Describe a pitot-tube traverse.
- Describe the instruments used to test and balance an air-handling system.
- Explain why air-handling systems need to be balanced.
- Explain how to clean and/or replace the filters in your HVAC system.
- Name common complaints related to air-handling systems and give common causes.
- Discuss the characteristics of sick building syndrome (SBS).
- Describe the process for investigating an SBS complaint and explain how to conduct a facility site review.
- Discuss ways a facility can minimize the probability of perceived SBS problems.
- Discuss internal and external SBS contributors, including HVAC systems, and discuss ways to eliminate or reduce the problems.
- Describe specific ways to control particulates, odors, and other contaminants.
- Define the abbreviations SBS, IAQ, BRI, VOC, and MCS.
- List the variables controlled by an air-handling system.
- Define comfort and explain how to predict whether or not people in a space will be comfortable.
- Define the following terms: laminar flow, turbulent flow, streamlining, and eddy currents.
- Differentiate between static pressure, velocity pressure, and total pressure in an air distribution system.
- Compare a dual-duct system to a single-duct system in both structure and operation.
- Describe the two basic types of fans used in air-conditioning systems.
- Define the terms system characteristic and point of operation.
- Explain why a knowledge of fan laws and performance curves is necessary when altering an air-handling system.
- Describe preventive-maintenance procedures for typical fans.
- Explain how to replace the bearings in a centrifugal fan.
- Define the term aspect ratio.
- Compare and contrast a radial duct system and an extended plenum system.
- Describe the structure and purpose of dampers and turning vanes.
- Identify a variety of fittings and connections used in a sheet metal ductwork system.
- Explain how and why ducts are insulated and reinforced.
- Identify common types of sheet metal seams and describe how each is fashioned.
- Explain the basic servicing and inspection procedures for ductwork systems.

- Demonstrate how to measure velocity pressure and show how airflow rates are calculated from these pressure readings.
- Explain in step-by-step fashion how to test and balance an air-handling system.

439 System Troubleshooting

- Tell what knowledge is essential for an effective troubleshooter to have.
- Tell what safety precautions must be followed when dealing with the mechanical, electrical, chemical, and environmental hazards involved in troubleshooting.
- List the necessary tools, equipment, and supplies needed to perform troubleshooting procedures.
- Give an example of each of the following applications: process refrigeration, commercial refrigeration, process air conditioning, comfort air conditioning.
- Explain why human relations skills are important to the refrigeration system troubleshooter.
- Name the six basic steps in the troubleshooting procedure.
- Explain why it is important to collect information from the equipment operator when a system is malfunctioning.
- Explain what type of information is contained on a nameplate and in the operations log of a system.
- Explain the structure and use of troubleshooting charts.
- Explain how to set up a preliminary checklist and how to select the most likely components and subsystems for further examination.
- List items to check out after making repairs to a refrigeration system.
- Explain how to use a troubleshooting chart.
- Explain how to isolate a control circuit failure from a motor circuit failure.
- List the causes of abnormally high control circuit resistance.
- Explain the difference between using an ohmmeter and using a voltmeter to check for a closed electric switch.
- Describe how to check contactor coils and motors for shorts and opens.
- Describe the symptoms of control air contamination and explain how to remedy it.
- Explain how to check thermostat output pressure.
- List at least three kinds of actuator problems and explain how to solve them.
- Describe the calibration procedure and explain its purpose.
- Explain how to calibrate a pneumatic controller.
- Distinguish between a refrigerant circuit problem and a conditioned-medium problem.

- Explain the procedure for checking refrigerant charge.
- Name major causes of variance in head and suction pressures.
- Explain how to isolate the cause of compressor short cycling.
- Explain how to use head-pressure readings and suction-pressure readings in diagnosing refrigeration problems.

440 Absorption Chillers

- Explain the differences between a mechanical refrigeration system and an absorption system.
- Describe the basic components in a simple absorption system and their functions in the refrigeration cycle.
- Distinguish between the characteristics of a weak solution and a strong solution and explain the function of each in the absorption cycle.
- Define the terminology associated with absorption systems.
- Describe the steps in a simple single-effect absorption cooling cycle.
- Discuss basic characteristics of water/lithium bromide absorption systems and name common industrial uses.
- Describe the differences between single-effect and double-effect absorption systems.
- Discuss the action of the solution and the refrigerant throughout a solution cycle within absorption systems used for heating only, cooling only, and simultaneous heating and cooling.
- Compare reverse, series, and parallel solution flow cycles.
- Discuss operating characteristics of various absorption machines and explain how the coefficient of performance (COP) is used in equipment selection.
- Describe the cause of crystallization and its effect on an absorption system.
- Discuss the general operating limits of absorption units, including ASHRAE 15 machine room safety requirements.
- Describe the basics and benefits of today's microprocessor-based operation and capacity control.
- Describe the normal absorption unit start, run, and shutdown sequences.
- Name various kinds of system operating controls and safety controls and explain their functions.
- Describe general setup and maintenance requirements and the procedures that keep the absorption chiller operating efficiently.

- Discuss the necessity for insulation and control of noncondensable gases, including air.
- Discuss the solubility of ammonia in water and other characteristics, including hazards, that affect ammonia absorption systems.
- Describe important characteristics of both single-effect and double-effect water/lithium bromide absorption chillers and ammonia/water absorption units.
- Briefly describe the operation and characteristics of centrifugal chillers.
- Briefly describe the operation and characteristics of reciprocating and screw positive displacement chillers.
- Name factors that must be considered in selecting air-conditioning equipment for specific applications and compare COPs for the various kinds of equipment.
- Discuss general cost criteria for the various types of energy used to drive the equipment and describe an appropriate absorption system application.
- Explain the function of the analyzer and rectifier in an ammonia absorption system.
- Explain the operation of the Platen-Munters ammonia/water/hydrogen system.
- Define the terms strong aqua and weak aqua as related to the ammonia water solution and compare them with the terms strong solution and weak solution as related to a lithium bromide system.
- Describe typical applications for industrial ammonia absorption systems and small residential and commercial ammonia absorption systems.
- Name reasons why ammonia absorption systems are likely to be used increasingly in the future.
- Discuss reasons for continuing testing and development of advanced absorption systems.
- Describe current developments in the GAX ammonia/water residential heat pump systems.
- Describe triple-effect systems and compare absorption and adsorption cycles.
- Explain how special-application absorption systems use recovered heat, waste heat, or a solar array to provide the energy for operation.
- Describe the properties of non-standard solution pairs.
- Explain how two kinds of hybrid arrangements incorporate the absorption system.

441 - Heat Pumps

- Explain how a heat pump differs from standard air-conditioning equipment.
- List the benefits of heat pump systems.

- Describe the heating, cooling, and defrost heat pump cycles.
- Define degree-day.
- List considerations in sizing heat pumps.
- Compare the operation of water-to-water and water-to-air heat pump systems.
- Compare the operation of ground-to-air and air-to-air heat pump systems.
- Describe the operation of solar-assisted heat pump systems.
- Describe the operation of geothermal heat pump systems.
- Describe the operation of dual-fuel heat pump systems.
- Discuss the differences in configuration and installation of split and packaged heat pump units.
- Determine heat pump system balance points and explain their relationship to system capacity.
- Discuss the use and control of supplemental heat.
- Discuss ARI single-point and seasonal heating and cooling ratings for heat pump equipment.
- Explain how several common variables affect heat pump operating costs.
- Describe how to use the heating degree-day, cooling degree-day, and bin methods of estimating heat pump system energy use.
- Describe common problems of heat pump systems in the heating mode.
- Explain why heat pump systems include an accumulator.
- Describe the indoor and outdoor coils, indoor air handling components, and various metering (flow-control) devices.
- Briefly discuss the requirements of reciprocating and scroll compressor operation as used in heat pump systems.
- Discuss the use and operation of the reversing valve and check valves in heat pump systems.
- Explain the functions of the equalizer tank, heat exchanger, and filter-driers in heat pump systems.
- Briefly describe indoor and outdoor controls and popular defrost control systems.
- Describe the operation of the pressure differential and temperature differential defrost methods.
- Compare the advantages and disadvantages of the timed defrost and time-and-temperature defrost methods.
- Compare the construction and operation of electromechanical and solid-state defrost controls.

- Explain the functions of pressure controls, heat sequencers, and the emergency heat relay in heat pump systems.
- Describe typical starting and lockout devices used on heat pumps and explain why systems include transformers, contactors, and overload protectors.
- Discuss considerations in selecting the best location for outdoor unit installation.
- Discuss considerations in selecting the best location for indoor unit installation.
- Describe installation practices that help the air distribution system fulfill its purpose.
- Discuss procedures for installing refrigerant lines and primary and auxiliary drain lines.
- Discuss the requirements for installing electrical wiring.
- Describe additional requirements for installing a packaged heat pump unit.
- Describe basic checkout procedures for the compressor crankcase heater, air distribution system, and all heat pump mountings.
- Describe basic steps in leak testing and charging a heat pump unit and discuss basic requirements for post-installation checkout of heat pump insulation and piping.
- Describe both the general post-installation checkout of the electrical system and tests to check specific electrical connections.
- Explain how to check the operation of the system thermostat, outdoor thermostats, and defrost controls.
- Name ways to increase blower output and explain why operator instructions are important.

464 Purging, Piping, and Safety

- Explain the reasoning behind the dual hazard assessment requirements of a worst-case ammonia release and the more practical alternative ammonia release.
- Discuss special piping situations that require alternative sizing or installation.
- Describe the basic differences between ASHRAE and ASME codes and IIAR standards and guidelines.
- Discuss several main points in the ASHRAE 15-1994 safety code for mechanical refrigeration.
- Describe code requirements based on the occupancy classifications, leak probability classifications, and refrigerant characteristic classifications.
- Describe several requirements in the ASME B 31.5 refrigeration piping code concerning the materials and fabrication of refrigeration piping systems.
- Name several safety requirements specified by IIAR 2 for ammonia refrigeration equipment.

- Describe the kinds of information provided by IIAR bulletins.
- Discuss the purposes of Process Safety Management and describe the thirteen elements that make up PSM.
- Describe the process for estimating a plant's ammonia inventory and establishing a plant ammonia library and explain why each is needed.
- Discuss the personnel and steps involved in developing a PSM plan for a specific refrigeration plant.
- Describe the process hazard analysis (PHA) and explain how it can reduce the likelihood of ammonia accidents and spills.
- Describe the requirements for preparing standard operating procedures (SOPs) for all normal plant service, repair, and maintenance.
- Discuss contractor responsibilities for PSM.
- Discuss the importance of management-of-change procedures in keeping paperwork up-to-date.
- Describe the purposes of the EPA Risk Management Plan and compare it to the OSHA Process Safety Management program.
- Discuss the hazards of working with ammonia and the importance of using personal protective equipment to avoid or minimize the effects of an ammonia release.
- Discuss the importance and difficulties of presenting the required release data and plan to the community.
- Discuss the toxic end point criteria for an ammonia release and distinguish between rural and urban end points and differences in requirements.
- Describe correct first aid procedures pertaining to contact with ammonia vapor and liquid.
- List common noncondensable vapors and discuss their effects in a refrigeration system.
- Discuss the power penalty resulting from noncondensable gases in terms of compression and loss of refrigeration capacity
- Explain how to determine the presence of noncondensables.
- Explain how to minimize the entrance of noncondensables and describe common entry points.
- Compare the features and operation of manual and automatic purging equipment and name the best connection points for the purge unit.
- Discuss the economic benefits of the purge unit in terms of typical payback times.
- Discuss the relationship between pressure drop requirements and pipe sizing.

- Discuss the factors that affect the pressure drop in a pipe.
- Explain the significance of the Reynolds number and the distinction between laminar and turbulent flow.
- Discuss the use of various kinds of line sizing charts including flow rate tables, equivalence tables for fittings and valves, and pressure drop charts.
- Explain how to select the proper suction line, discharge line, and liquid line sizing for an ammonia system.

TPC Ammonia Refrigeration

461 Ammonia Refrigeration Basics

- Name common uses of ammonia and describe benefits of ammonia refrigerant in terms of ozone depletion and global warming potentials (ODP and GWP).
- Describe the properties of ammonia and explain how they affect the use of ammonia as a refrigerant.
- Discuss the toxicity and flammability of ammonia and its classification as a hazardous material.
- Discuss important features of ammonia saturation curves, reactions with metals, and MSDS criteria.
- Name two standards governing ammonia refrigeration systems and describe the four main ammonia safety concerns, steps for their prevention, and first aid treatment in the event of exposure.
- Briefly compare absorption and mechanical compression systems, compare dynamic and positive-displacement compressors, and name those generally used in industrial ammonia refrigeration systems.
- Explain how a positive-displacement compressor increases the ammonia vapor pressure.
- Define British thermal unit (Btu), specific heat, sensible heat, latent heat, and tons of refrigeration.
- Name four primary components in single-stage ammonia refrigeration systems and describe their functions.
- Describe the functions of the oil separator, high-pressure liquid receiver, king valve, and suction accumulator in single-stage ammonia refrigeration systems.
- Define superheat, enthalpy, and entropy and explain how they are used on the pressureenthalpy (P-H) diagram

- Define compression ratio and explain its importance in single-stage and two-stage industrial ammonia refrigeration systems.
- Explain why flash gas removal, booster discharge-vapor desuperheating, and interstage liquid cooling are desirable in the two-stage system.
- Plot a two-stage refrigeration system on an ammonia pressure-enthalpy (P-H) diagram.
- Name the primary and secondary components of a two-stage refrigeration system and describe component functions.
- Explain why a two-stage system requires less overall power than a single-stage system.
- Explain why suction accumulators are needed and describe the damage that can result from liquid entering the compressor.
- Discuss the purposes and reasoning behind the design features, including the boil-out coil, of suction accumulators.
- Describe the various ammonia refrigerant liquid/vapor separation criteria.
- Explain how the intercooler deals with flash gas and desuperheats the booster discharge.
- Describe basic differences between a flash intercooler and a shell-and-coil intercooler.
- Describe typical configurations for alternate intercoolers provided with internally compounded compressors.
- Describe the various functions performed within the recirculation vessel.
- Discuss the advantages and disadvantages of recirculation systems.
- Describe design features of horizontal and vertical recirculation vessels.
- Discuss the surge-volume requirements of a recirculation system and reasons for highlevel alarm/cutout controls on the recirculation vessel.
- Describe the features and drawbacks of various kinds of liquid-refrigerant pumps.
- Describe the operation of pumper drum (gas-pressure) recirculation systems and controlled pressure receiver (CPR) recirculation systems.

462 Positive Displacement Compressors

- Discuss lubrication management in screw compressor systems.
- Describe the approved method for removing oil from the system low-side oil pots.
- Name lubricants recommended for use with ammonia systems and explain the importance of using only specified lubrication products.
- Briefly describe the evolution of ammonia reciprocating compressors.
- Describe typical design features of today's reciprocating compressors.

- Explain how capacity control and proper lubrication are achieved in ammonia reciprocating compressors.
- Explain how to use volumetric and adiabatic efficiency data and the performance factor in sizing or selecting compressors for an application.
- Describe the function and basic design requirements of internally compounded reciprocating compressors.
- Describe the basic operation of sliding-vane rotary booster compressors.
- Explain the principle of fixed volume ratio compressors.
- Describe typical rotary compressor design features.
- Explain why sliding-vane rotary compressors have been replaced by screw compressors.
- Discuss the reasons for rotary vane compressor speed limitations and the causes and effects of blade wear.
- Describe how capacity control is achieved in rotary compressors.
- Discuss the developments that led to the use and acceptance of the oil-flooded screw compressor in industrial refrigeration.
- Describe typical design features of single-screw and twin helical screw compressors.
- Explain how the compression system works within screw compressors.
- Compare fixed and variable volume machines and their applications.
- Explain how the capacity-control slide valve and variable V_i slide stop function.
- Describe the general range of application for screw compressors.
- Explain why screw compressors are provided as units and describe the main systems that make up the screw compressor unit.
- Explain why a vertical or horizontal oil separator may be preferred and explain why check valves are used on the unit inlet and outlet connections.
- Discuss drive methods and oil distribution methods used on screw compressors and describe tasks provided by the lubricant within the compressor.
- Explain how the refrigerant vapor/oil separation system operates and list the methods and benefits of oil cooling in screw compressor units.
- Discuss the beneficial uses of the side port and the operation of the screw compressor capacity reduction slide valve control system.
- Name the codes and other criteria with which ammonia refrigeration systems must comply to establish and maintain a safe work environment.
- Discuss the purposes of lubricants in ammonia systems.

- Define the terms used to describe and specify lubricants and oils and discuss the importance of the miscibility and viscosity relationships between lubricants and ammonia.
- Describe the proper methods for handling lubricants.

463 Evaporators, Conditioners, and Controls

- Discuss the benefits of the newer electronic level controllers in the automatic control of liquid levels, safety alarms, and system shutdown procedures.
- Describe the operation and functions of the hand expansion valve and describe typical pressure regulating valve applications and methods by which the valve is controlled.
- Explain how the soft hot gas defrost system protects large industrial coils.
- Describe preset timer defrost methods.
- Describe the basic differences between air-cooled, water-cooled, and evaporative condensers and discuss the main operating features of each.
- Describe common defrost methods that do not use hot gas—electric, water, continuous glycol spray, and room air.
- Discuss system high-side and low-side float valve uses and describe the operation of mechanical float switches.
- Discuss the benefits of the evaporative condenser and explain why it has the lowest condensing temperature.
- Describe the design components of an evaporative condenser and explain how they work together to provide cooling.
- Discuss both the process of condenser selection and good and bad practices in locating condensers.
- Describe proper piping and equalization practices for both single and multiple condenser installations.
- Explain the need for condenser winterization and capacity control and discuss proper water treatment to control mineral and bacterial content.
- Discuss the relief valve safety requirements as specified by the ASHRAE 15 code.
- Explain why dual relief valves are used, describe proper positioning of the three-way diverting valve, and explain how to calculate relief valve flow capacity.
- Describe the functioning of the various stop valves used on ammonia systems and explain why angle valves are preferred.
- Describe the various kinds of check valves and solenoid valve uses in automatic control on ammonia refrigeration systems.

- Explain why ice and frost form on a coil and discuss the problems resulting from this formation.
- Describe the basic process of defrosting by means of hot gas from the compressor discharge.
- Discuss the construction and operation of evaporators used as air coils (coolers), including the benefits of penthouse installation.
- Describe the operation of various common kinds of freezers and ice makers.
- Explain how subcoolers, intercoolers, and thermosiphon oil coolers function as evaporators.
- Describe common DX and flooded liquid chiller arrangements
- Discuss the reasons for coil fins and enhanced tube designs.
- Describe how a dump trap functions and how it differs from a pumped overfeed system.
- List basic principles affecting evaporator heat transfer ability in DX and liquid overfeed systems.
- Describe the various level controls used in a recirculation unit and explain how the liquid refrigerant is pumped from the recirculation unit through the evaporator coils.
- Explain how a thermostatic expansion valve works and why a DX coil must have more heat transfer surface than an overfeed coil.
- Describe the liquid feed and operation of flooded ammonia shell-and-tube fluid coolers.
- Discuss basic details of evaporator operation, including the use of secondary coolant.
- Discuss the operation of a CPR system.
- List the benefits of a machine room liquid recirculation unit and benefits compared to direct expansion systems.
- Explain how refrigerant flows in a thermosiphon system and describe the requirements for a surge drum in a gravity feed system.

TPC Electrical Training Courses

1005 Introductory - Introduction to Electricity

- Understand fundamentals of electricity such as voltage, current, basics of magnetism and Ohm's Law
- Understand inductance, capacitance, and resistance.
- Understand the basics of DC circuits, including series circuits, parallel circuits, and series parallel circuits.

- Understand fundamental components that control circuit current and voltage, their applications, and their associated symbols

1006 Introductory - Mobile Electricity

- Understand fundamentals of electricity such as voltage, current, basics of magnetism and Ohm's Law
- Understand inductance, capacitance, and resistance
- Understand the basics of DC circuits, including series circuits, parallel circuits, and series parallel circuits
- Understand fundamental components that control circuit current and voltage, their applications, and their associated symbols
- Understand how a battery stores and dispenses electrical power
- Understand the alternator, which generates electricity and works with a voltage regulator to charge the battery and supply electrical power to the rest of the vehicle's electrical system
- Understand the starting system, and the variations of components in the two circuits of the starting system
- Understand remote start and stop features associated with many mobile vehicles

1008 Introductory - ACDC Drives

- Understand Magnetism and Electromagnetism, Direct-Current Motor Terms, Direct-Current Motor Operation, Direct-Current Motor Classification
- Understand AC Motor Hardware, AC Motor Operation, NEMA Classifications
- Understand DC Drives Control Section, Power Section, DC Drive Functions
- Understand AC Drives Control Section, Power Section, AC Drive Functions, Power Conversion
- Understand AC-DC Braking Methods
- Understand Brushless DC Motor Commutation, Motor Performance, Selecting a Brushless Motor
- Understand Brushless Servo Drives, Power Input Section, Power Output Section, Control Section, Input/Output, Servo Actuators

1009 Introductory - Multimeter Basics

- Understand the fundamentals of using electrical testers
- Understand testing circuits
- Understand different circuit components

201 Basic Electricity and Electronics

- List the parts of a transistor.
- State the definition of an integrated circuit.
- Name the parts of a vacuum tube and describe the function of each part.
- Describe an electromagnet.
- Select the best tapes for insulating splices, restoring the outer protecting covering on a splice, and connecting motor leads.
- Explain how to make a pigtail splice and a fixture splice.
- State the purposes of cable protection.
- State the difference between ac and dc.
- Solve for R, E, I, and P in a simple electrical problem.
- Explain how to use lifting magnets, magnetic pulleys, and magnetic clocks.
- State the characteristics of an electrical conductor and an electrical insulator.
- State the definition of electric current.
- Explain the relationship of potential difference to the flow of electric current.
- State the definition of Ohm's Law.
- Identify the purpose and parts of an ammeter.
- Identify symbols for resistors, capacitors, and relays in an electric circuit diagram.
- Explain the operating principles of resistors, capacitors, and inductors.
- State the meaning of each band in the resistor color-code system.
- List the factors to consider when choosing a resistor.
- Explain how to connect capacitors in parallel and in series.
- Explain the difference between a conductor and an insulator.
- Identify a bare conductor, a covered conductor, an insulated conductor, a stranded conductor, a cable, and a cord.
- State the definitions of insulation resistance and dielectric strength.
- Explain the difference between the terms in-phase and out-of-phase in an ac circuit.
- List the ways inductive reactance differs from resistance.
- Solve for potential difference, current, and resistance in a series and parallel circuit.
- Explain the importance of the transformer in ac electricity.
- Explain what a complete cycle of ac consists of and how it is produced.
- State the definition of ac inductance.
- Explain the difference between p-type semiconductor material and n-type semiconductor material.

- Describe the left-hand rule for magnetic field direction.
- Describe how magnetic force operates.
- State the most basic law of magnetic force.
- Describe how a photoelectric device works.
- Identify potential hazards when recharging batteries.
- Explain how to connect cells in series.
- Explain how to connect cells in parallel.
- Explain how liquid affects a static charge.
- State the definition of grounding.
- Explain the relationship between humidity and static electricity.
- List the main methods of producing potential difference.
- State the main difference between a primary cell and a secondary cell.
- State the definition of bonding.
- List the conditions that must exist in order for static electricity to cause ignition.
- List the common causes of static electricity in an industrial plant.
- Describe electron flow.
- State the definition of a cell.
- Describe the structure of an atom.
- Tell the difference between a compound and an element.
- Explain how electrical forces cause objects to attract or repel other objects.

202 Batteries and DC Circuits

- Explain how to conduct an initial charge.
- Discuss the different types of battery charges.
- List the common causes of cell failure.
- Explain how to mix electrolyte correctly.
- Explain how to treat both skin and eyes that have been splashed with acid.
- Define Ohm's Law and use it to solve a problem.
- State the definition of a branch point.
- Solve a problem using the power formula.
- State the definition of Kirchhoff's rules.
- Define work, power, torque, and efficiency.
- Describe a series circuit.
- Solve for E, I, and R in series circuits.
- State the basic rule you must follow when making changes in an equation.

- State the definition of a parallel circuit.
- Explain how to calculate the current in each branch of a parallel circuit.
- Explain how to calculate resistance in a parallel circuit.
- Calculate power in a parallel circuit.
- Find the reciprocal of any value.
- State the definition of a series-parallel circuit.
- Identify series, parallel, and series-parallel circuits.
- Explain how to calculate resistances in a series-parallel circuit.
- Demonstrate how to trace and simplify a circuit.
- Explain how the three types of dc motors differ.
- Demonstrate how to increase and decrease the speed of a dc motor by adding resistors.
- Identify a three-way switch.
- Calculate current and resistance using voltage divider circuits.
- State the difference between a primary cell and a secondary cell.
- Discuss electrochemical action.
- Explain how battery polarization works.
- State the definition of an electrolyte.
- List the factors to consider in selecting a battery.
- List advantages of dry cells.
- State the characteristics of dry cells.
- Explain how to create a 6 V battery from 1.5 V dry cells.
- Name the basic kinds of storage cells in use today.
- Explain how to calculate the rating required in a battery for a specific application.
- Name the items necessary to form a cell.
- Explain how plates in a cell are commonly assembled.
- List the advantages of nickel-cadmium battery.
- Discuss the construction of storage cells.
- List the steps in placing a new dry-charged battery in service.
- Name the three basic methods of charging batteries.
- Explain how to measure a cell's specific gravity.
- List causes of low specific gravity in a cell.
- Tell how to clean a wet, dirty battery cover.

203 Transformers and AC Circuits

- List the factors that determine inductance in a coil.
- State of definition of a waveform.
- Demonstrate how to calculate the frequency of an alternator's output.
- Explain how to calculate an effective value.
- Name the kinds of values that must be used when applying the dc rules and laws to ac circuits.
- Describe a triangle.
- State the definition of a vector.
- Identify the vector representing resistance in a vector diagram.
- Demonstrate how to calculate the total impedance in an ac circuit.
- Name the property of a coil that makes it resist changes in current.
- Name the parts of a capacitor.
- List the factors that affect the amount of charge stored in a capacitor at a given potential difference.
- Demonstrate how to install a multisection electrolytic capacitor.
- State the definition of capacitive reactance.
- State the definition of impedance.
- Explain how to calculate the impedance in series RLC, RL, or RC ac circuits.
- Demonstrate how to find the value of a phase angle for an ac circuit.
- Explain how to calculate the impedance in parallel RLC, RL, or RC ac circuits.
- State the definition of power.
- Demonstrate how to calculate power in an inductive circuit.
- State the reason why capacitors are added to circuits to increase the power factor.
- Explain how to install capacitors correctly.
- List the main advantages of the three-phase ac system.
- Demonstrate how to perform a breakdown test.
- Explain how to locate the exact point of a leak in a welded joint below the liquid level.
- List the steps in inspecting a transformer when a winding fails.
- List problems that are indicated by an increase in transformer operating temperature.
- State the definition of a current transformer.
- Explain what to look for during an inspection of sealed transformers.
- List the functions of an instrument transformer.
- Name general kinds of transformers.

- List the temperature limits for each class of transformer insulation.
- Explain how oil-immersed transformers are cooled.
- Name the common methods of connecting three single-phase transformers for three-phase operation.
- Explain how to select the correct location for a transformer.
- List the kinds of losses that occur in transformers.
- State the definition of counter electromotive force.
- Demonstrate how to convert a frequency in Hz to a frequency in radians per second.
- State the definition of phase sequence.
- Demonstrate how to calculate the RMS power in a three-phase circuit.
- Explain how to measure the total power consumed by the load in a three-phase circuit.
- Explain the difference between the primary winding and the secondary winding in a transformer.
- Explain how the windings are positioned in a core-type transformer.

204.1 Electrical Measuring Instruments

- Describe the purpose of the analog-to-digital converter in a digital meter.
- Define the terms digital meter and analog meter.
- Identify and label graphs of integrator output from a dual-slope integrating meter.
- Explain how time is related to voltage measurement in an integrating digital meter.
- Differentiate among the terms accuracy, sensitivity, and resolution.
- Explain how a D'Arsonval meter movement works.
- Describe the parallax effect, and explain how to avoid it when using an analog meter.
- State the sensitivity formula for an analog meter.
- Describe the differences and similarities between an analog ammeter and a voltmeter.
- Explain how ammeters and voltmeters are protected internally from overcurrent.
- Explain how a make-then-break switch works.
- List three safety precautions to take when using multimeters.
- Describe how an analog oscilloscope works.
- Describe advantages of a digital oscilloscope over an analog oscilloscope.
- Demonstrate how to measure voltage with an oscilloscope.
- Show two methods of determining phase angles with an oscilloscope.
- Identify which meters should be connected in series in a circuit and which should be connected in parallel.
- Describe how an analog wattmeter works.

- Explain how it is possible to overload a wattmeter, even with the meter's pointer at less than full-scale deflection.
- Explain characteristic differences between a series ohmmeter and a shunt ohmmeter.
- Explain why ohmmeter scales read from right to left, instead of left to right, and why they are nonlinear.
- Describe the internal circuits and basic operation of an opposed-coil megohmmeter.
- State the primary safety precaution to take when using an ohmmeter.
- Describe two methods used by ohmmeter manufacturers to extend the range of their instruments.
- Explain how to test for opens, shorts, and grounds, using a megohmmeter.
- Describe how to make zero-adjustments on ohmmeters and megohmmeters.
- Explain why variable resistors are needed in battery-powered ohmmeters.
- Demonstrate how to measure ac and dc current and voltage with a multimeter.
- Describe the function of a current probe.
- Explain how to isolate the source of a glitch with a graphical multimeter.
- Demonstrate how to read the screen display of a graphical multimeter in the Trend mode.
- Explain why you set a meter to its highest range before taking your first measurement.
- Define autoranging and autopolarity.

205.1 Electrical Safety and Protection - v2

- List the three main factors that determine the effect of electric current on the human body.
- Explain what to do if a person is a victim of electric shock.
- Name four precautions you can take to guard against electric shock.
- Define the term qualified person.
- Summarize the basic rules of electrical safety.
- Describe appropriate clothing and PPE to wear when working with electricity.
- Explain first aid procedures for eyes.
- Describe the devices used to lock out power.
- Tell how to keep plant personnel out of an area where electrical work is being performed.
- Explain the purpose of a voltage tester.
- Explain the concepts of energy control and zero energy state.
- Summarize the OSHA lockout procedure.

- Explain how portable power tools are grounded.
- List some common symptoms of electric shock.
- Summarize the steps involved in administering CPR.
- Understand the purpose and scope of the National Electrical Code.
- Define key terms related to the National Electrical Code.
- Determine requirements for electrical installations.
- Contrast current electricity and static electricity and explain why each can be hazardous.
- Identify the correct extinguisher to use on flammable liquid fires and on energized electrical equipment fires.
- Explain how a dual-element cartridge fuse works.
- Locate and reference common National Electrical Code articles.
- Identify common calculation tables.
- State the NEC rules on installing fuses.
- Explain how to test a circuit for proper grounding.
- State the reason why circuits should be grounded.
- Explain how a circuit breaker works.
- Describe molded-case circuit breakers.
- List the steps involved in fuse replacement and/or circuit breaker reset.
- List the steps in determining the correct rating of the motor feeder protection.
- Explain how a ground-fault circuit interrupter works.
- Explain how to select a thermal overload relay.
- Explain how thermostatic, resistance, and thermocouple detectors work.
- Contrast temperature-sensing devices and current-sensing devices.
- Explain how various relays provide motor protection.
- Define single phasing.

206 DC Equipment and Controls

- List the advantages of dc over ac.
- List the brush problems caused by eddy currents.
- State the criteria for selecting replacement semiconductors.
- State the definition of a silicon controlled rectifier.
- Explain how an SCR works.
- Explain how to increase the effective current and the power delivered to a motor by an SCR motor control.

- List four dc applications of SCRs.
- List four ac applications of SCRs.
- Explain how to test field coils to determine the condition of the insulation.
- List the signs of a short-circuited field coil in a machine.
- Explain how to replace a field coil in a machine.
- Discuss how to maintain relay contacts.
- Name the criteria for satisfactory commutation.
- Name three types of batteries commonly used in the plant.
- Explain how the electroplating process works.
- Explain the difference between straight polarity and reversed polarity in arc welding.
- State the definition of residual magnetism.
- Explain the effects of distance on magnetic field strength.
- Discuss the characteristics and uses of solenoids.
- Discuss the characteristics of relays.
- Explain the function of each of the main parts of the dc generator.
- Explain how to increase the number of pulses during each rotation of an armature.
- Demonstrate how to combine the shunt field and series field to produce a compound generator.
- State the reasons why electrical losses, magnetic losses, and mechanical losses occur in the dc generator.
- Explain what happens during self-induction and commutation.
- Define CEMF.
- State the difference between speed regulation and speed control.
- Name the kinds of dc motors.
- Explain the different operating characteristics of series, shunt, and compound motors.
- Name the basic parts of an armature assembly.
- Describe the main differences between a lap winding and a wave winding.
- List the characteristics of a single-reentrant simplex-lap winding.
- State the definition of copper loss, eddy-current loss, and hysteresis loss.
- Demonstrate how to perform preventive maintenance on an armature.
- Name three factors that determine the performance and reliability of a relay.
- Name the six types of commonly used relays.
- Explain the operation of each type of relay.
- Explain dynamic braking.
- Describe how a disc brake is attached to a motor.

- List the kinds of functions performed by motor-control devices.
- Name the types of motor controllers and discuss their operating characteristics.
- Explain how each of the three kinds of overload relays works.
- Name the kinds of resets for overload relays.
- Discuss the operating principles of vacuum tubes and rectifiers.
- Name the four types of filters commonly used in rectifier circuits.
- List common causes of semiconductor failure.

207 Single-Phase Motors

- Discuss the functions of the major motor components.
- List the reasons a repulsion motor might fail to start.
- Explain eddy-current loss in the universal motor.
- List the advantages of a universal motor.
- Explain how the speed of the universal motor is controlled.
- List the criteria for selecting carbon brushes for universal motors.
- State reasons why a universal motor might have poor torque.
- State the definition of a salient pole.
- Explain the operating principles of a shaded-pole motor.
- Discuss the operating principles of a hysteresis motor.
- Explain the difference between an unexcited synchronous motor and an excited synchronous motor.
- State the definition of the term synchro.
- Describe motor construction in a synchro.
- Demonstrate how to calculate terminal-to-terminal stator voltage.
- State the reason why the control transformer is important in a synchro control system.
- Explain how to connect a differential synchro system.
- State the definition of a servomechanism.
- List the four characteristics needed to keep a regulated quantity matched to a reference value in a servomechanism.
- Explain how an amplidyne control system works.
- Discuss how to control overtravel in a servomechanism.
- Explain how to determine conductor size for motors.
- State the definition of a controller.
- List the conditions under which the frames of stationary motors must be grounded.

- Demonstrate how to determine the size of a dual-element fuse when two or more motors are connected to one feeder.
- List the electrical and mechanical factors to consider in selecting a motor for a specific application.
- Demonstrate how to test bearings for wear.
- Explain how to test capacitors.
- State the reason why proper belt tension is important.
- List the common causes of excessive brush sparking.
- Explain how the running windings are connected to make a dual-voltage motor run on either 120 or 240 volts.
- Select the best capacitor to use as a substitute for a defective capacitor when an identical unit is not available.
- List problems that cause the circuit breaker to trip when you turn on a capacitor motor.
- Discuss the operating principles of a repulsion-start induction-run motor.
- Explain how to seat new brushes on the commutator.
- Demonstrate how to calculate the number of electrical degrees in one complete rotation of a motor.
- Explain how a centrifugal switch works.
- State the reason why a second stator winding is important in the single-phase induction motor.
- Explain how to identify motor leads when there are no tags or colors to identify them.
- Describe a skein winding.
- List the ways to change the speed of a motor by changing the number of poles.
- Discuss some common motor problems.
- State the definition of a capacitor.
- Explain how to make a split-phase motor operate as a capacitor-start motor.
- List the parts of a rotor.
- List the data given on a typical motor nameplate.
- Explain how an induction motor works.

208 Three-Phase Systems

- Describe a squirrel-cage rotor.
- List the factors that determine the strength of the magnetic field in an induction motor.
- Discuss pole-phase relationships.
- Demonstrate how to reverse the rotation direction of the magnetic field.

- Discuss the relationship between rotor speed and frequency.
- List the main parts of the stator.
- List operating characteristics of a wound-rotor motor.
- Demonstrate how to check rotor windings for short circuits.
- State the definition of a standard motor.
- List factors that contribute to the torque of an industrial synchronous motor during starting.
- Explain the effects of an amortisseur winding in a synchronous motor.
- State the definition of pull-in torque.
- State the reason why using synchronous motors can increase a low power factor in a plant.
- List the characteristics of brushless synchronous motors.
- Discuss the operating characteristics of multispeed induction motors.
- Select the best motor for driving equipment that requires the same torque at both high and low speeds.
- State the definition of a variable-torque motor.
- Explain the difference between a constant-horsepower motor and a constant-torque motor.
- List the steps in measuring the resistance of the insulation on motor windings.
- Explain how to raise the temperature of a motor winding.
- List the steps in lubricating motor bearings.
- List the conditions that must exist before you can lubricate bearings.
- Explain how a motor starter works.
- Explain the difference between open transition and closed transition.
- Name the common kinds of reduced-voltage starters.
- List the steps in inspecting motor starters.
- Explain how to select the best motor starter for a particular application.
- Explain how to prevent backspin.
- Describe a three-phase alternator.
- Describe the plugging process.
- Explain the difference between low-voltage release and low-voltage protection.
- State the reasons why 240 V systems are not as widely used as are 480 V systems.
- Explain the difference between system grounding and equipment grounding.
- List the benefits of system grounding.
- Explain how an overcurrent relay works.

- Name common circuit-opening devices.
- Discuss the operating characteristics of alternators.
- List the characteristics that must be considered when you work on alternator windings.
- Name the causes of change in potential difference between terminals as the load changes.
- Demonstrate how to calculate three-phase power in an alternator.
- Explain how an automatic auxiliary generator works.
- List the methods of overcoming voltage-drop problems when starting loads.
- List the parts of a hydraulic starting system.
- State the definition of a prime mover.
- List the four guidelines to follow when troubleshooting or performing routine maintenance on generators.

209 AC Control Equipment

- Describe the difference between a manual starter and a magnetic starter.
- Explain the function of a shading coil in a magnetic starter.
- Explain the effects of low voltage on a controller.
- State the reason why holding-circuit interlocks are required on magnetic starters and contactors.
- Demonstrate how to reverse the shaft rotation of a three-phase motor.
- Discuss the characteristics of industrial switches and controls.
- Identify the five most commonly used NEMA pushbutton stations.
- Demonstrate how to mount an oil-tight control station both vertically and horizontally.
- Explain the difference between standard and press-to-test indicating lights.
- Explain how a three-wire control circuit works.
- List the main parts of a precision snap-action limit switch.
- Describe the contact arrangement of a snapswitch.
- Describe the kinds of actuators used in limit switches.
- List the rules for the proper design and application of limit switch cams.
- Explain how a mercury switch works.
- Explain how a drum switch works.
- Select the best switch for stopping a motor quickly.
- List the criteria for selecting a plugging switch.
- Identify different types of pressure switches.
- State the definition of pressure differential.

- Explain how a reset timer works.
- Describe the different types of timers.
- Compare and contrast an electric counter and a time totalizer.
- Select the best control device for use where a machine cannot be controlled by time.
- Demonstrate how to set up a chart for a programmed control circuit.
- State the definition of a relay.
- Explain the function of relay contacts.
- Select the best relay for use where large movement of the contacts or high contact force is required.
- List the advantages of a reed relay.
- Tell why industrial relays usually have double-break contacts.
- List the requirements an enclosure must meet in order to be called explosionproof.
- List the characteristics of switchgear and industrial controls in hazardous conditions.
- List three situations in hazardous locations that require the use of seals.
- List the three basic conditions that can cause fire or explosion.
- Demonstrate how to terminate armored cable that enters an explosionproof housing.
- Name the two relays required for automatic starting of a synchronous motor.
- Explain how an automatic sequence-accelerating relay works.
- Select the best starter for use where the highest possible starting torque per ampere of line current is required.
- List the characteristics of different types of resistance starters.
- Describe a Y-delta starter.
- Define the term motor control center.
- Name the main advantages and disadvantages of back-to-back MCC construction.
- Explain how to install an MCC.
- Define a note, a caution, and a warning as each relates to MCC equipment.
- List the checks to conduct prior to releasing an MCC for plant operation.
- State the function of terminal blocks.
- Demonstrate how to make a terminal connection.
- Tell when to use different types of connectors.
- Describe the proper lacing of wires in a control panel.
- Explain when and how to use a wiring duct.

210 Electrical Troubleshooting

- Explain how undervoltage release works.

- Identify a control relay on an electrical schematic.
- State the NEC requirements for fuses in ungrounded conductors.
- Explain component numbering on electrical schematics.
- Name the kinds of drawings used by electrical specialists.
- Identify electrical symbols commonly used for building diagrams.
- Describe a one-line diagram.
- Discuss the different types of drawing characteristics.
- Explain how severe three-phase voltage unbalance affects a three-phase motor.
- List the advantages of inherent protection.
- Describe how to use a checking-sequence chart.
- Select the best starter for use where it is undesirable to put a heavy load on the power supply.
- Explain how to change the speed of a squirrel-cage motor.
- Explain the effects of age on a selenium rectifier.
- Name the protective devices used in electrical systems and pneumatic systems.
- State the definition of a bistable device.
- List the functions of a static control device.
- List causes of electrical and mechanical vibration in a dc motor.
- Explain how oil saturation affects brushes in a dc motor.
- Explain how maximum bearing operating temperature is determined.
- List problems in the motor control that can cause sudden or unexpected changes in motor speed.
- Explain how to salvage a water-soaked motor.
- Identify various kinds of three-phase motor failures.
- Demonstrate how to conduct a balanced-current test on a three-phase, Y-connected winding.
- Describe how to troubleshoot a motor circuit.
- List the reasons why a magnet coil burns or short-circuits.
- List the steps in troubleshooting a defective motor.
- Explain how a mechanical latching relay works.
- Explain how an electronic timing relay operates.
- Demonstrate how to reverse the rotation of a three-phase induction motor.
- Explain the function of limit switches in reversing-motor applications.
- List the symptoms of a reversed phase in a three-phase winding.
- List the steps in troubleshooting a new machine.

- List the information to be included in a motor location file.
- Select the best method for identifying a motor.
- List the features that must appear on an elementary wiring diagram to make it comply with JIC standards.
- Explain how to identify external leads that have become defaced.
- Demonstrate how to test for an open circuit in a split-phase motor.
- Describe the elements of a planned maintenance program.
- Explain the function of lamps, ballasts, and lighting controls.
- Describe the basic troubleshooting process.
- Detail how to troubleshoot common lamp-ballast system problems.
- Describe lighting system commissioning.
- Detail how to troubleshoot common occupancy-sensor and dimming-system problems.
- Name and describe the elements of a sequence of operation.

211 Electrical Safety in the Workplace - Understanding NFPA 70E v2015

- Determine the general maintenance requirements for electrical equipment.
- Identify alerting techniques.
- Learn safety procedures to follow while working with overhead lines.
- Recognize electrical hazards and know when it is justifiable to work near such hazards.
- Understand the purpose and use of energized electrical work permits.
- Determine shock hazards associated with approach boundaries.
- Determine required arc flash protection.
- Determine the type of personal protective equipment required for a task.
- Develop an understanding of insulated tools and other protective equipment.
- Recognize terms that are common to NFPA 70E and the NEC.
- State the purpose and scope of NFPA 70E Chapter 1 and the responsibilities of employer and employee.
- Give an overview of the contents of Article 110.
- Describe the relationship between host employers and contract employers.
- Identify the training requirements, types of training, and documentation procedures covered in the article.
- Explain how to develop an electrical safety program.
- Identify the risks of working with electrical hazards.
- Explain how to use test equipment and instruments safely.

- Understand the process of achieving an electrically safe work condition.
- Explain lockout/tagout principles and procedures.
- Describe the different forms of control procedures.
- Define the requirements for lockout/tagout devices.
- Identify the procedures for removing and releasing lockout/tagout devices.
- Understand the requirements for temporary grounding equipment.
- Define and understand accessibility terms.
- Explain how and why NFPA 70E was created.
- State the purpose of NFPA 70E.
- Understand how OSHA can use NFPA 70E in enforcement actions.
- Explain which areas are covered by NFPA 70E and which are not covered.
- Explain how NFPA 70E is arranged and organized.
- State the differences among mandatory rules, permissive rules, and explanatory material.
- Understand the importance of terms described in Article 100.
- Define terms related to electrical safety and hazards.
- Define terms related to electrical grounding and ground fault equipment.
- Identify safety-related maintenance practices.
- Determine to what degree fuses and circuit breakers should be maintained.
- Understand the maintenance of equipment in hazardous locations.
- Explain the requirements for maintaining and testing personal protective equipment.
- Understand the hazards of working with special electrical equipment.
- Determine the safety requirements for special equipment.
- Identify safe work practices for electrolytic cells.
- Identify safe work practices for installing and maintaining batteries.
- Identify safe work practices for lasers.
- Identify safe work practices for power electronic equipment.
- Identify safe work practices for laboratories.
- Identify safe work practices for capacitors.
- Reference publications related to NFPA 70E.
- Obtain additional information related to NFPA 70E.
- Identify examples of approach and arc flash boundaries.
- Develop a safety program and hazard/risk forms.
- Discuss lockout/tagout procedures.

- Be aware of the National Electrical Code references related to NFPA 70E.
- Discharge capacitors safely.
- Describe the electrical maintenance requirements for facilities.

TPC Energy Conservation

376 Energy Conservation Basics

- Explain sample energy audit.
- Explain fuel usage information.
- Describe building and equipment data.
- Describe conservation opportunities.
- Describe what is energy.
- Explain how fossil fuels developed.
- Explain mining and drilling methods.
- Explain how fossil fuels are put to work.
- Explain nuclear power and nuclear reactors.
- Explain solar energy and how to convert solar to electrical energy.
- Describe wind as an energy source.
- Describe hydroelectric power.
- Evaluate energy sources.
- Measure energy.
- Explain the history of energy use.
- Describe when the fossil fuel age begins.
- Describe what are other traditional sources of energy.
- Explain how much energy is enough.
- Explain the end of cheap oil.
- Explain the world's energy record.
- Describe what are fossil fuel reserves.
- Describe the increase in coal use.
- Describe what fossil fuels produce other than just energy.
- Explain alternative and synthetic fuels.
- Describe gas and oil from coal.
- Explain nuclear fuels and nuclear fusion.
- Explain geothermal energy sources.
- Define biomass.
- Explain using fuels to generate electricity and the fuels most often used.

- Explain energy losses in consumer areas.
- Explain what effects of climate are on energy use.
- Explain degree-days, cooling-degree days, and using degree-day figures.
- Explain where energy can be conserved.
- Describe the cost of saving energy.
- Explain ROI and payback period.
- Explain establishing priorities.
- Explain recognizing and correcting energy waste in building structures.
- Explain energy loss in heating and cooling.
- Describe sample heating/cooling corrective measures.
- Describe energy waste in mechanical systems.
- Explain some energy savers for mechanical systems.
- Describe recognizing electrical energy waste.
- Explain electrical conservation examples.
- Explain electric utility charges.
- Describe computer monitoring and control.
- Explain what is an energy audit.
- Explain mini-audits.
- Describe what are the tools required for the energy survey.

377 Energy Losses in Buildings

- Explain energy in motion.
- Explain methods of heat transfer and explain heat flow in structures.
- Describe how to detect heat loss.
- Define heat flow terms.
- Describe the history of insulation and early forms of insulation.
- Explain industrial insulation.
- Describe the building envelope.
- Explain the effect of insulation.
- Explain environmental considerations.
- Describe windbreaks and foundation plantings.
- Explain building orientation.
- Describe roof construction and characteristics of roofs.
- Explain vapor barriers and ventilation.
- Explain types of insulation and applications.

- Describe checking heat leaks.
- Describe infrared scanner.
- Describe payback periods.
- Explain sample calculations.
- Describe wall construction.
- Explain totaling R values.
- Explain construction considerations for insulating materials.
- Explain eliminating condensation.
- Explain vapor barriers.
- Explain cold-side venting.
- Describe convective looping.
- Explain insulating foundations.
- Describe metal walls and how to insulate metal walls.
- Define U values.
- Define payback.
- Explain sample calculation.
- Describe infiltration.
- Explain window heat loss by conduction.
- Explain corrective measures.
- Define caulking, weatherstripping, and air locks.
- Explain reducing conductive heat.
- Explain loss/gain through windows.
- Describe hermetically sealed windows and removable storm windows.
- Define draperies.
- Explain solar heat gain and preventing heat gain.
- Define shading.
- Define payback calculations.
- Explain above-grade floors and the vapor barrier for above-grade floors.
- Explain ground cover.
- Explain crawl space flooding and crawl space ventilation.
- Describe below-grade floors and on-grade floors.
- Describe correct surface drainage.
- Explain effects of floor covering.
- Describe pipes and duct work.

- Explain payback calculations.
- Explain slab-foundation retrofit and wooden overlay retrofit.

378 Heating/Cooling System Efficiency

- Explain fluid flow in piping systems and insulating piping systems.
- Explain balancing hydronic systems.
- Define centrifugal pumps and explain how to maintain them.
- Explain strainers in hydronic systems.
- Define control valves, three-way control valves, and explain how to maintain control valves.
- Define boilers and explain furnace and boiler maintenance.
- Explain energy conservation in furnaces and boilers.
- Explain stack gas analysis.
- Describe purchased steam and hot water and metering steam and hot water.
- Explain steam traps and steam trap maintenance.
- Explain humidifiers.
- Explain heating controls maintenance.
- Describe domestic hot water.
- Describe the types of refrigeration equipment.
- Explain mechanical compression systems.
- Explain the vapor-compression cycle.
- Explain absorption refrigeration cycle.
- Explain external refrigeration controls.
- Explain internal controls and checking system operation.
- Define evaporator temperatures and condenser temperatures.
- Describe equipment for cooling condensers.
- Describe cooling towers.
- Explain the difference between evaporative condensers, air-cooled condensers, and water-cooled condensers.
- Explain self-contained air conditioning units.
- Define heat pumps.
- Explain the direct use of evaporative cooling systems.
- Describe refrigerators and freezers.
- Describe the nature of fluid flow.
- Explain reducing distribution system losses.

- Explain reducing resistance to air movement.
- Define fans.
- Explain insulating air ducting.
- Describe human comfort and the environmental factors affecting human comfort.
- Explain heat generated within a building and explain thermal zones.
- Explain the basic all-air HVAC system and name the types of all-air HVAC systems.
- Explain what are single-path systems.
- Explain what are multiple-path systems.
- Describe general energy conservation.
- Explain the guidelines for HVAC.
- Describe measuring air velocity and volume flow rate.
- Describe air pressure within a duct system.
- Define the pitot tube.
- Describe other airflow measuring devices.
- Describe building ventilation requirements and how to determine ventilation requirements.
- Explain the cost of using outside air.
- Explain heat recovery systems.
- Explain exhaust systems and conserving energy in exhaust systems.
- Explain maintaining system components.
- Explain what are heating units.
- Describe warm air furnaces.

379 Mechanical Energy Conservation

- List the three major maintenance items related to centrifugal pumps.
- Identify several places where energy losses can occur in a fan system.
- Explain how to determine whether a fan is suited to the system in which it is operating.
- Name the three basic parts of a mechanical system.
- Explain the concept of mechanical efficiency.
- Give examples of the three basic kinds of friction encountered in mechanical systems.
- List at least four purposes of lubrication.
- Define viscosity, viscosity index, and pour point.
- Tell why oil and grease seals are used.
- Explain why proper bearing lubrication is important.
- Name the drive component responsible for the most powerloss.

- List three functions of couplings.
- Show how to check coupling alignment.
- Define vibration and explain why vibration control is important.
- Compare and contrast static unbalance and dynamic unbalance.
- Explain the reasons for vibration isolation.
- Tell why proper pump installation is important to energy conservation.
- Describe the problems that can occur if pump bearing lubrication is neglected.
- Demonstrate the proper method of replacing pump packing.
- Tell why air cleaner care is important to an energy conservation program.
- Describe what a PM program involves and tell why it is important.
- List at least ten tips for fuel-conscious vehicle operation.
- Compare and contrast the applications of IC engine and electric vehicles.
- Name several maintenance procedures important to efficient compressor operation.
- List at least two energy-saving tips to keep in mind when dealing with conveyor operation.
- Explain the purpose of a take-up in a conveyor system.
- Differentiate between unit-handling belt conveyors and bulk-handling belt conveyors.
- Tell how lagging can reduce energy waste.
- Name one type of conveyor that is not capable of wasting energy and explain some of its uses and limitations.
- List the three basic methods used to drive elevators.
- Identify common causes of energy waste at loading docks.
- Name the three basic areas offering energy conservation opportunities in vehicles.
- Explain why it is important to use the correct size vehicle for a job.
- Explain the importance of battery maintenance in an electric vehicle.

380 Electrical Energy Conservation

- Name six types of lighting in order of efficacy.
- List advantages and disadvantages of each of the following types of high intensity discharge lighting: mercury, metal halide, HPS, and LPS.
- Explain the importance of a good lighting system.
- Define uniform lighting and selective task lighting and tell how they affect energy consumption.
- Determine recommended and actual lighting levels.
- Distinguish between lumens and footcandles as measures of light.

- Give examples of ways in which switching modifications can be used to reduce energy consumption.
- Describe several ways to use natural lighting more efficiently.
- Tell why cleaning lamps and fixtures is important.
- Compare and contrast incandescent and fluorescent lamps.
- Differentiate between R lamps and ER lamps.
- Explain how power factor is calculated in a single-phase and three-phase circuit.
- Tell why capacitors are important from an energy conservation standpoint and name three sources of capacitance in an electrical system.
- Explain the information found on a motor nameplate and tell how it relates to energy conservation work.
- Calculate load losses and no-load losses of motors, speed controls, and transformers.
- Evaluate the value of energy-saving devices.
- Conduct an electrical energy audit.
- Determine the efficiency of an electrical system.
- Give three reasons for metering electric energy use.
- Name the three basic types of meters used in energy conservation work and explain how each is used.
- Differentiate between indicating and recording meters.
- Name the two metered quantities that determine the major part of an electric bill.
- Define power factor and load factor and explain why each is important.
- Show how to use meters to identify usage patterns and peak usage periods.
- Compare and contrast manual and automatic demand control and give an example of each.
- Name several types of demand controllers and tell how each operates.
- Name the two familiar forms energy may take.
- List three elements of impedance in an ac system.

TPC Industrial Fundamentals

101 Reading Blueprints

- Describe what a machine is, and explain what it does
- Explain why more than one orthographic projection is needed to show an object on a blueprint
- Identify an object from an orthographic drawing
- Identify details, markings, and machine parts from an assembly drawing

- Identify elements located within the title block of a detail drawing
- Name the two basic methods of joining machine parts
- Name and identify from an exhibit several types of threaded fasteners
- Name the two basic methods of permanent joining
- Identify gears, bearings, and belt drives on drawings
- Define a radial development of a truncated pyramid
- Name building materials, given their standard symbols
- Explain how to find useful information on a flow diagram
- Explain how to find useful information on an industrial plant
- List the contents of a set of building drawings
- Describe the purpose of a structural drawing
- Name the components represented by common symbols on hydraulic and pneumatic drawings
- Name the components in a simple hydraulic power system
- Name the components in a simple pneumatic power system
- State the definition of an exploded view
- Identify an assembly drawing
- Identify a compound rest swivel on an assembly drawing
- Identify a specific part on an assembly drawing
- Describe the difference among coils, strips, and sheet metal
- Describe how a ventilation system works
- State the purpose of an arrow on a duct symbol
- Demonstrate how to lay out a development
- Identify types of screw threads from a specification
- Name the main parts of a lathe
- Explain why joints are sometimes brazed instead of soldered
- Explain how to assemble a screwed joint
- State Pascal's Law
- Discuss the purposes of the components of hydraulic systems
- State the definition of piping
- Define the terms voltage, current, and power
- Identify different types of pipe joints
- Identify piping-system components shown in a single-line drawing
- Define electrochemical corrosion

- Identify different electrical symbols on a drawing
- Identify the power distribution panels in your plant
- Identify different types of conduit and cable
- Select the best electrical drawing to use when looking for a faulty circuit between the basement and the first floor
- Explain how electricity at 480 V is reduced by a transformer to 120/240 V
- Name the four kinds of sketches
- Identify an isometric sketch
- Describe the appearance of a perspective drawing
- Explain how a refrigeration system works
- Describe the types of air-conditioning controls
- Name three kinds of condensers used in air-conditioning systems
- Explain the difference between unitary and central air-conditioning equipment
- Explain how to find useful information on a duct drawing
- Discuss how to sketch straight and curved lines
- State the definition of a vanishing point

102 Reading Schematics and Symbols

- List some characteristics of schematics
- Identify a schematic among other kinds of technical drawings and diagrams
- Explain how flow is indicated on a schematic
- State the definition of a schematic
- Identify the symbols for various types of valves
- Explain fusion welding
- Identify various types of lines on schematics
- Identify the following schematics by their symbols: electrical, fluid-power, piping
- Describe a set-by-step approach to troubleshooting when using a schematic
- Give the purpose of legends and other tables of symbols
- Demonstrate the ability to determine pipe size from a diagram
- List and give the purpose of the main parts of a hydraulic system
- List and give the purpose of the main parts of a pneumatic system
- Explain the purpose of local areas on a hydraulic or pneumatic diagram
- Describe a composite symbol
- Explain the difference between a closed and an open hydraulic or pneumatic system
- Describe a fluid-power system

- Identify the symbols for various kinds of fittings and describe the function of each fitting
- Explain how to trace an electrical circuit
- Explain the difference in current flow between a series circuit and a parallel circuit
- Explain the difference between a check valve and a cock valve
- Explain the purpose of a wiring diagram
- Demonstrate how to read an electrical schematic
- Identify the objects represented by the symbols on an industrial schematic
- Explain the function of a valve in a piping system
- Name the ways of joining pipe
- State the meaning of symbols and lines on an electrical schematic
- Explain the difference between a fuse and a circuit breaker
- Identify the actuator in a hydraulic diagram
- Explain the purpose of local areas on a hydraulic or pneumatic diagram
- Describe the subsystems of an air conditioning system
- Identify the symbols for air conditioning and refrigeration components
- Explain the operation of an air conditioning and refrigeration control system
- Name the main methods of fusion welding
- Name the five types of joints and three ways of welding each joint
- Demonstrate how to read and interpret a complete welding symbol

103 Mathematics in the Plant

- State the definition of the sine, cosine, and tangent of an angle
- Demonstrate how to find the value of the sine, cosine, and tangent of a given angle, using either a trig table or a calculator
- Demonstrate how to find the inverse sine, inverse cosine, and inverse tangent of a given value, using either a trig table or a calculator
- Demonstrate how to measure an angle with a protractor
- Define a circle
- Demonstrate how to write products and quotients of numbers given in exponential form
- Demonstrate how to calculate the value of a number raised to a fractional power
- Demonstrate how to calculate the value of a number raised to a negative power
- Explain the importance of an algorithm in a calculator
- Describe how a calculator with arithmetic logic performs calculations
- Describe how a calculator with algebraic logic performs calculations
- Describe how a calculator with RPN logic differs from other calculators

- Explain the differences among a line, a line segment, and a ray
- Identify a radius, a chord, and a diameter of a circle
- Demonstrate how to duplicate an angle using a straightedge and a compass
- Demonstrate how to calculate the value of an expression by performing mixed operations in the correct order
- Demonstrate how to write an algebraic equation, based on a relationship stated in words
- Demonstrate how to solve an algebraic equation for a specific variable
- Identify values as length, area, or volume, based on their units of measurement
- Demonstrate how to calculate the surface area and volume of a rectangle, a circle, a cylinder, and a sphere, given the dimensions of each and a list of formulas from which to choose
- Demonstrate how to calculate the length of one side of a right triangle, given the other two sides
- Identify a right triangle, an equilateral triangle, and an isosceles triangle in a drawing
- Describe the difference between a number and a numeral
- Demonstrate how to add three four-digit numbers, with carrying
- Demonstrate how to subtract two four-digit numbers, with borrowing
- Demonstrate how to multiply a four-digit number by a two-digit number
- Demonstrate how to divide a four-digit number by a two-digit number
- State the definition of a fraction
- Demonstrate how to reduce a fraction to its lowest terms
- Demonstrate how to find the lowest common denominator of two fractions
- Demonstrate how to add three common fractions having different denominators
- Describe the difference between a decimal fraction and a common fraction
- Demonstrate how to round off a decimal fraction to a specified number of places
- Demonstrate how to multiply one decimal fraction by another
- Demonstrate how to round off the products and quotients of decimal fractions
- Demonstrate how to change fractions from common form to decimal form, and vice versa
- Demonstrate how to calculate the ratio of two numbers
- Demonstrate how to use a ratio to express a change
- Demonstrate how to use a ratio to solve a typical plant problem
- Demonstrate how to calculate the value of a number given in exponential form

104 Making Measurements

- Identify various units of measurement
- State the definition of the joule, the coulomb, and the horsepower
- Explain how to calculate pressure
- Explain the difference between mass and weight
- Demonstrate how to measure the volume of an object
- Explain the difference between the Celsius scale and the Fahrenheit scale
- List the seven base units in the SI (metric) system
- Name three derived units
- Define work and power in SI units
- Explain what power is and how it is measured
- Name two metric measuring instruments and their U.S. Standard equivalents
- List five units used for making linear measurements
- Demonstrate how to use a micrometer
- Explain what each head of a combination square is used for
- State the definition of parallax error
- Define the different types of tolerance
- Explain the difference between a continuous dial and a balanced dial on a dial indicator
- State the definition of pitch on a screw
- Name two hardness tests
- Explain why nondestructive testing is preferable to destructive testing on surface coatings
- Explain why weight-density and the angle of repose are important to workers who handle and store loose bulk material
- Name the two types of conveyors and list three specific examples of each type
- Name the three basic measurements of bulk materials
- Demonstrate how to find the radius of a circle, given its area, and how to find the area of a circle, given its circumference
- Demonstrate how to convert a typical order of lumber into board feet
- Name the three measurements of motion
- State the definition of speed
- Explain the difference between average and instantaneous velocity
- Demonstrate how to interpret a graph of motion.
- Explain how the velocity of an object is shown on a graph of motion

- State the definition of force
- Demonstrate how to calculate torque
- State an advantage of using a balance instead of a scale
- Demonstrate how to draw a force diagram
- Name both the metric and the U.S. Standard units of measurement for force, mass, and acceleration
- Explain the difference between heat and temperature
- Name four different scales for measuring temperature
- Explain the use of heat-sensitive pellets, crayons, and paints
- Explain how Bourdon tubes work
- Explain how a pyrometer works
- State the definition of a fluid
- Describe how liquids differ from gases
- List the instruments used to measure the level of water
- Name two instruments that measure the flow of fluids, and explain how they work
- List the parts of an atom
- Define potential difference
- Identify a wattmeter
- Describe the difference between alternating current and direct current
- Describe the difference between an ohmmeter and an ammeter

105 Metals in the Plant

- Name five metals or alloys commonly used in industry
- Name five mechanical properties of metals
- Describe the uses of three metal alloys
- Describe the metalworking processes of casting, forming, and machining
- State the definitions of four mechanical properties of metals
- Describe the three kinds of stress
- List the ways in which metal may fail
- State the definition of elasticity
- Demonstrate how to calculate the density of metal
- Name four kinds of molds used in casting
- List the steps in making a sand mold
- Describe the differences between hot-chamber and cold-chamber die casting
- Describe extrusion

- List the steps involved in making a part by powder metallurgy
- Name the commercial grades of cast iron
- List the important mechanical properties of commercial grades of cast iron
- Describe the forms in which carbon appears in commercial grades of cast iron
- Describe the process of smelting
- State the definition of steel
- Name the method by which a steel was made, based on its AISI code
- Demonstrate how to conduct a spark test
- Identify steel sheets having as-rolled edges and cut edges
- Describe two differences between alloy steels and steels containing only iron and carbon
- Describe the two basic processes, and state the four major purposes, of heat treatment
- Explain why distortion and cracking occur during welding
- Explain how to anneal, harden, and temper a steel drill
- State the definitions of low-carbon, medium-carbon, and high-carbon steels
- List the steps in producing copper from ore
- List the contents of brass, Muntz metal, admiralty brass, bronze, nickel silver, aluminum bronze, and cupro-nickel
- Describe dezincification in brass
- Name the three groups of brasses, based on their zinc content, and the three categories of hardness
- List the contents of red brass and describe its uses
- List advantages and disadvantages of the oxide coating on aluminum
- State the definition of wrought-grade and casting-grade aluminums
- Describe the advantages of aluminum-silicon alloys
- Describe how aluminum is anodized
- Name the classifications of aluminum solders
- Name the alloys of magnesium and titanium
- List the useful properties of magnesium and titanium
- Describe how to join magnesium alloys
- Describe the precautions that must be taken when working with magnesium and titanium
- Describe the uses of magnesium and titanium in industry
- Describe the properties and characteristics of lead
- List the properties that are improved by adding nickel to stainless steel

- Describe how tinplate is manufactured
- Describe how zinc is refined and processed

106 Non-Metals in the Plant

- State the definition of a solid, a liquid, a gas, and a plasma
- Demonstrate how to change a liquid to a solid
- Demonstrate buoyancy
- Identify an object less dense than water and an object more dense than water
- List six possible combinations of matter
- State the definition of a thermoplastic and a thermoset
- Describe injection molding, foam molding, and extrusion
- Select the best bonding agent for joining polyethylene parts
- Describe the steps in patching a damaged area with glass-plastic material
- Name four properties of rubber
- Explain the vulcanizing process
- Select the best hose for handling oils or gasoline
- Describe how to use a pinhole locator
- List the kinds of sheet rubber that should be kept on hand in the storeroom of an industrial maintenance department
- State the definition of hardwood and softwood
- Name the grades of softwoods and hardwoods
- Describe a radial cut, a crosscut, and a tangential cut
- Demonstrate how to calculate the number of board feet in a piece of lumber
- List the ingredients in concrete
- State the definition of spalling, crazing, and dusting
- Explain how to remove an oil stain from concrete
- Demonstrate how to mix a small batch of mortar
- List the steps in repairing a hole in wallboard
- Name the ways by which heat can be transferred
- State the formula for determining the thermal conductivity coefficient (K value) of a thermal insulator
- Demonstrate how to install blanket insulation
- Select the best materials for use as electrical insulation where resistance to flame and high temperature is important
- List the safety rules that should be followed when working with insulating materials

- List the factors to consider in selecting a protective coating
- Name the qualities and characteristics of pigments and vehicles
- List the safety precautions to follow when using paints containing solvent thinners
- State the definition of primer
- Demonstrate how to prepare a metal substrate for coating
- List the safety precautions to follow when working with liquid and solid chemicals
- Name the general classifications of cleaning agents
- Select the best acid for cleaning stainless steel and aluminum
- State the reasons why aerosol spray cans are potentially dangerous
- List considerations in selecting an oil for a particular use
- State the definitions of adhesiveness, curing, drying, joint, pot life, and tack
- List the characteristics of thermosetting and thermoplastic adhesives
- Demonstrate the plastic-welding process
- List uses of anaerobic adhesives
- Select the best tapes for insulating and protecting electrical connections and wires
- List four uses of carbon and fabricated carbon products in industry
- List three properties of carbon that make it useful in electrical and mechanical applications
- Describe the carbon-arc welding process
- List the most common causes of brush noise
- Describe how to cut and install individual packing rings around a shaft

107 Hand Tools

- Explain how to hold a rigid rule correctly when measuring an object and show from which point the measurement begins
- Describe how to set lock joint transfer-type calipers
- Identify vernier calipers
- Explain how to take a measurement with a micrometer caliper
- Name the parts of a combination square
- Identify types of materials used for making wrenches
- Identify open-end, box-end, socket, socket-head, adjustable, torque, and striking-face wrenches
- Describe the two sizes that are important in identifying a socket wrench
- Identify standard, Phillips, offset, and spiral-ratchet screwdrivers
- List the steps to follow when driving a screw

- Identify a straight pipe wrench, a Stillson wrench, a chain pipe wrench, a strap wrench, and a compound-leverage wrench
- Explain how to use a pipe wrench
- Explain why a machinists' vise should not be used for holding pipe
- Explain how to thread pipe
- Explain how to clean a pipe tool
- Explain how to cut and flare tubing
- Explain how to use a mechanical tube bender
- List the steps in joining hubless pipe
- Explain why the drain pipe should be completely covered by the force cup
- Name the criteria used in selecting line clearing tools
- List the steps in measuring pipe when using the center-to-center measuring systems
- Explain how to use an EMT bender
- List the parts of a knockout punch
- Name the uses of the all-purpose tool
- Explain how to use a neon circuit tester
- Describe the difference between a rip saw and a crosscut saw
- Explain the basic difference between a compass saw and a keyhole saw
- Describe the different types of planes
- Identify a Forstner bit
- Explain the working of a plumb line
- Explain how to mix a small batch of mortar
- List the uses of a trowel
- Define tuckpointing
- Explain why flat concrete surfaces must be screeded
- Explain how to repair the following problems: (a) small plaster cracks, (b) shrinkage cracks, (c) loose or bulging plaster
- Explain how to replace a broken pane of glass in a window
- Identify different types of snips and punches
- Identify the bench stakes discussed in this lesson
- List six safety practices to follow when working with sheet metal
- Describe different types of sheet metal
- Select the proper hacksaw blades for cutting various materials
- Explain the difference between single-cut and double-cut files
- List the types of taps usually found in a tap set

- Explain how to remove a reamer from a hole
- Explain how to prevent synthetic and fiber rope from unraveling
- Explain how individual wires and strands of wire are formed into wire rope
- Identify the most appropriate sling for use near corrosive chemicals
- Identify a slide-hammer puller
- Describe different kinds of slings and loads

108 Portable Power Tools

- Name four parts that are common to both the light-duty drill and the heavy-duty drill
- Name the parts of a drill bit
- Explain how to drill a blind hole
- Explain how to inspect a drill bit, both visually and through testing
- List the safety rules to follow when using electric power tools
- Explain the difference in hammering action between a percussion hammer and a rotary hammer
- Select the proper chisel to use for each of the following jobs: brick cleaning; general demolition work; edging, chipping, and channeling; and removing floor tile
- List the precautions that should be taken to ensure electrical safety when using an electric hammer
- Name two safety items to use when operating an electric hammer in damp or wet areas
- Explain how drill size is determined
- Describe the chiseling action of a bull point chisel when it is used to clean masonry seams
- Describe how to use a rivet buster
- Explain drill speed requirements
- Identify various types of drill bits used in pneumatic hammers
- Identify the operating advantages of pneumatic tools
- Define stalling torque
- Describe the clutch action of direct drive, positive drive, and adjustable torque drive
- Explain how to install a bit in an electric screwdriver
- Describe how to install multiple fasteners correctly in a circular pattern
- List tool safety rules to follow when using power screwdrivers and wrenches
- Describe the difference between pneumatic and electric nutrunners
- List other names for both the saber saw and the reciprocating saw
- Describe the cutting action of a saber saw

- Explain how to draw a saw blade with regular set teeth and one with wavy set teeth
- List the types of band saw blades described in this lesson and a few characteristics of each
- Name the major parts of a circular saw
- Describe the cutting action of a circular saw
- List the factors that determine feed speed
- State the definition of an arbor
- Identify different types of blades
- Discuss how to use a router
- Name the major parts of a router
- Explain how to use a router and bit
- Identify a rabbeting joint, a straight joint, and a mortising joint
- Explain how to adjust and use a power plane
- Explain how to install a sanding belt
- Identify different types of sanding belts
- Explain how to flush the gear chamber of a belt sander
- Discuss the assembly of a sanding disk
- List the safety rules to follow when using a disk sander
- State the meaning of each symbol in the six-symbol standard marking system for grinding wheels
- Explain the correct procedure for mounting a grinding wheel
- List safety rules to follow when using a grinder
- Discuss how to maintain grinders
- State the reasons for sharpening tools
- Explain the use of whetstones
- Identify a bench stone
- Explain how to sharpen taps, dies, screwdrivers, and chisels

109 Industrial Safety and Health

- Explain the purpose and operation of the following devices: GFCI, fuse, circuit breaker.
- Identify typical hazardous electrical locations.
- Explain the purpose of explosion-proof and intrinsically safe electrical equipment.
- List at least two electrical safety rules in each of the following areas: clothing, equipment, water, lockout/tagout.
- List and explain the four elements of the fire pyramid.

- Name and give the definition of the five classes of fires.
- Define the terms flash point and spontaneous combustion.
- Name the fire-fighting agents, and explain how they work and when to use them.
- Explain the use of at least two different types of portable fire extinguishers.
- List three ways of preventing fires.
- Explain fire hose and fire extinguisher maintenance.
- Define ergonomics and tell how poor ergonomic conditions affect the body.
- List three actions that you can take to protect your hearing.
- Tell the cause of each of the following lung diseases: asbestosis, lung cancer, brown lung, black lung, silicosis.
- Contrast ionizing and nonionizing radiation.
- Compare and contrast personal and background sampling.
- Explain the importance of protecting women from exposure to certain chemicals.
- State the purpose of the EPA.
- Explain the importance of industrial housekeeping.
- List safety measures related to walkways, stairs, and floor openings.
- Tell how to protect yourself and others when working in traffic paths.
- Describe at least three hazards involved with each of the following and tell how to safeguard against them: working at elevations and working in confined spaces.
- Calculate the proper placement of a straight ladder based on its working length.
- Name two kinds of scaffolds and give at least one safety rule associated with each.
- List symptoms of heatstroke, heat cramps, and heat exhaustion.
- Name two major safeguards necessary when welding.
- Explain how to handle and store cylinders safely.
- Define the terms accident and hazard.
- Name and define the four main types of hazards.
- List and define various types of accidents.
- Compare meanings of the terms unsafe act and unsafe condition.
- Name the three ways in which a toxic substance can enter your body.
- List ways in which a company must plan for emergencies.
- Tell the main reason for prompt accident investigation.
- State the purpose of the OSHA Act.
- List the specific rights of employees under the Act.
- Explain what to do in a dangerous work situation.

- List things that you can do to help keep your workplace in compliance with OSHA standards.
- Explain the function of each of the following agencies: NIOSH, EPA.
- List the four main objectives of OSHA's Hazard Communication Standard.
- Tell what information can be found on an SDS.
- List employer and employee responsibilities related to PPE.
- Tell why work clothing can be dangerous if it fits poorly.
- Explain the importance of proper glove selection when handling chemicals.
- Describe the proper fit of a hard hat.
- Compare everyday eyeglasses, industrial safety glasses, and safety goggles.
- Identify the noise level at which you must wear hearing protection.
- Name the two basic kinds of respirators.
- Define the terms chemical hazard, physical hazard, and health hazard.
- Name three kinds of physical hazards.
- Name and describe at least four kinds of health hazards.
- Identify common symptoms of chemical exposure.
- List three health hazard exposure routes.
- Name three ways of controlling chemical hazards and exposures.
- Explain first aid procedures to follow when you are exposed to a hazardous chemical.
- Name at least three causes of hand tool accidents.
- List one safety rule to follow when using each of the following: screwdriver, wrench, pliers, hammer, chisel, knife.
- Describe proper and improper dress for working with rotating power tools.
- Explain the importance of grounding electric tools.
- Name two hazards involved in pneumatic tool use and explain how to guard against them.
- Explain proper handling and storage of gasoline.
- List simple safety procedures and precautions related to material handling.
- Describe how to lift, carry, and put down a load.
- Explain safety principles for working with or around industrial trucks.
- Discuss safety rules for working with or around conveyors, slings, and hoists.
- Describe how and where to store materials.
- Identify a machine's point of operation and other pinch points, and explain why they are dangerous.
- Identify different kinds of mechanical safeguards, and explain why they are necessary.

- Define zero energy state.
- Describe the lockout/tagout procedures established by the OSHA energy control standard.
- Define the following terms: electric current, circuit, potential difference, ampere, watt, ohm, and volt.
- State Ohm's Law.
- Explain the function of each wire in a simple electric circuit and tell the color(s) used to identify each.
- List the three factors that affect the severity of an electric shock.
- Describe the effects of electric current on the human body.
- Tell the three most important points about first aid for shock victims.
- Explain how static electricity is generated, why its accumulation can be dangerous, and how it can be avoided.
- Explain the importance of proper grounding.
- Define the term "ground fault" and explain how ground faults occur.

110 Troubleshooting Skills

- List the responsibilities of a troubleshooter.
- Discuss how to use schematics when troubleshooting.
- Identify differences in schematics.
- Explain how to use a troubleshooting chart.
- Identify bearing wear problems.
- Identify pump failure problems and solutions.
- Identify types of hosing.
- Identify different plant equipment and their problems.
- State the definition of switchgear.
- Identify current voltage characteristics of wire.
- List the safety rules to follow when working with electrical equipment.
- Identify a pictorial diagram, a block diagram, and a schematic diagram.
- Explain how to troubleshoot an electrical problem.
- Explain what to do if you are the first member of the emergency crew.
- Explain the spare parts requisition form.
- Discuss the four main parts of practical machine maintenance.
- State the definition of planned maintenance.

- List the information that should be included on record sheets or file cards as part of the machine inventory.
- List the benefits to be accrued from an effective lubrication program.
- Describe the proper sag in a drive chain.
- Explain how to service a battery properly.
- State the reason why efficient troubleshooting is important in a production plant.
- Name the four common troubleshooting aids.
- List the steps in troubleshooting a machine.
- List the steps in troubleshooting a system.
- Describe a typical maintenance organization.
- State the reason why good communication between plant personnel is needed.
- List the ways a person usually sees himself/herself.
- Explain the communication cycle.
- Explain the correct method of delivering a written message from your supervisor to another person.
- List the steps to recognizing normal machine operations.
- List the questions you should ask yourself when a machine fails.
- List the signs of a machine in need of service.
- Describe a blueprint.
- Identify a multimeter (VOM).
- Identify different troubleshooting test equipment.
- List the information you must know about mechanical or electrical systems before you can troubleshoot them successfully.
- Name the commonly used items that should be carried in every troubleshooter's tool box.
- List the information that should be recorded in a machine equipment record.
- List the steps to follow in reading a pneumatic or hydraulic schematic.
- Identify calibration standards.

151 Chemical Hazards - OSHA's Hazard Communication Standard

- Define chemical hazards by the Hazard Communication standard and the two categories into which they are divided.
- Explain key requirements for carrying out each fundamental action.
- Identify the common physical forms of chemical hazards and the industrial operations that produce or release vapors, mists, dusts, and fumes.

- Name three basic routes of exposure of health hazards.
- Explain the key factors that affect the degree of hazard.
- Discuss common methods of controlling chemical hazards.
- Explain how to detect exposure hazards and symptoms.
- Explain the purpose, availability, preparation, and basic content of MSDSs.
- Give examples of the health hazard information contained in MSDSs and how it is used.
- Give examples of the physical hazard information contained in MSDSs and how it is used.
- Describe typical MSDS instructions on special precautions and procedures.
- Identify the goals of the Hazard Communication standard and the agency responsible for writing and enforcing the standard.
- List the eight fundamental actions required by the OSHA Hazard Communication standard and state the purpose of each.

TPC Industrial Hydraulics

1001 Introductory - Industrial Hydraulics

- Identify the various types of fluid power conductors and connectors and their application in working together to deliver fluid throughout the system
- Describe the operating principles of limit switches and inductive, capacitive, ultrasonic, and photoelectric sensors
- Understand fundamentals of proportional control
- Identify the various types of proportional control valves and how they function
- Understand applicable control valve circuits
- Identify hydraulic valve schematic symbols
- Identify the various types of pumps and how they function
- Understand applicable control mechanisms
- Identify pump schematic symbols
- Learn applied formulas
- Identify the various types of hydraulic cylinders
- Identify different types of hydraulic motors, how they function, and their associated schematic symbols
- Become familiar with basic hydraulic formulas associated with calculating force and torque, as they relate to hydraulic actuators.
- Identify the various types of hydraulic control valves and how they function
- Understand applicable control valve circuits

- Identify hydraulic valve schematic symbols
- Identify the various types of modular valve applications, their functionality, and associated symbolism
- Identify types of accumulators with their corresponding schematic symbol
- Learn how an accumulator functions, their applicable applications, and basic accumulator maintenance requirements
- Identify the various types of fluid conditioning components with their corresponding schematic symbol and to understand their proper applications
- Understand terminology associated with fluid cleanliness, such as micron, beta ratio, and ISO code

1002 Introductory - Mobile Hydraulics

- Identify the various types of pumps and how they function, to understand applicable control mechanisms, to identify pump schematic symbols, and learn applied formulas
- Identify the various types of hydraulic cylinders, the different types of hydraulic motors, how they function, and their associated schematic symbols
- Understand basic hydraulic formulas associated with calculating force and torque, as they relate to hydraulic actuators
- Identify the various types of hydraulic control valves and how they function, understand applicable control valve circuits, and identify hydraulic valve schematic symbols
- Identify the various types of modular valve applications, their functionality, and associated symbolism
- Identify types of accumulators with their corresponding schematic symbol
- Understand how an accumulator functions, their applicable applications, and basic accumulator maintenance requirements
- Identify the various types of fluid conditioning components with their corresponding schematic symbol and to understand their proper applications
- Understand terminology associated with fluid cleanliness, such as micron, beta ratio, and ISO code
- Identify the various types of fluid power conductors and connectors and their application in working together to deliver fluid throughout the system
- Describe the operating principles of limit switches and inductive, capacitive, ultrasonic, and photoelectric sensors
- Understand each of these additional components, their functionality, and their applications in the hydrostatic drive transmission

- Understand open versus closed center circuits and the functional description of forward, neutral, and reverse drive circuits
- Understand the fundamentals of proportional control
- Identify the various types of proportional control valves and how they function
- Understand applicable control valve circuits
- Identify hydraulic valve schematic symbols

TPC Industrial Packaging

311 Introduction to Packaging

- Describe types of machines for packing and filling.
- Describe packaging machinery breakdown maintenance procedures.
- List specific requirements for planned packing machinery maintenance.
- Explain packaging machinery lubrication selection, scheduling, and correct application.
- Explain the operation of the lever and crank.
- Describe the differences among types of cams.
- Explain how ratchet wheels and Geneva wheels produce intermittent motion.
- Describe reciprocating and oscillating drive mechanisms.
- Describe the differences between intermittent-motion and continuous-motion packaging machines.
- Explain the difference in operation among types of product detectors.
- Explain the uses of gross, net, and check weighers.
- Explain how to time a packaging machine with a timing dial.
- Define the four basic machine elements—timing, position, stroke, and alignment.
- List correct packaging machine troubleshooting steps.
- List functions of couplings.
- Explain the differences among the more common types of couplings.
- Describe how to check coupling alignment and how to correct a misalignment.
- Compare the different types of belt and chain drives.
- List the characteristics of film.
- Compare the different types of shrink film.
- Name the different types of combination films.
- Describe the uses of water-soluble film, kraft paper, and chipboard.
- List the advantages and disadvantages of glass and plastic bottles and jars.
- Describe the operation of vertical and horizontal flexible film packaging machines.

- Explain how volumetric pouch filters work.
- Explain how carton-filling and liquid-filling machines work.
- Describe methods of filling by count.
- Describe how plastic and metal tubes are sealed.
- Explain the operation of different types of film sealers.
- Describe how high-frequency sealers work.
- Explain the basics of cappers and seamers.
- Describe correct procedures for using hot and cold glues.
- Describe the different types of speed reducers and gearing.
- Describe the basic features of ac motors.
- Compare the different types of fractional-horse-power motors and three-phase motors.
- List the features of common and special types of motors.
- Explain how variable-speed units work.
- Describe the operation and use of electric, hydraulic, and mechanical clutches.
- Describe the elements of a packaging machine's start-up sequence.
- Explain how thermal overload and melting allow starters work.
- Explain the use of detectors and time delays in packaging machine control.
- Describe how adhesive is applied.
- List the components in a scale system.
- Explain how typical check weighers work.
- Describe proper troubleshooting maintenance, and installation techniques for scalers.
- Compare the mechanisms of counterbalances and force balance systems.

312 Packaging Machinery

- Understand blister packing.
- Understand gravity and vacuum filling.
- Understand bottle filling and capping.
- Understand pressure liquid filling.
- Understand aerosol fillers.
- Understand bag forming and filling.
- Understand pouch filling.
- Understand volumetric filling machines.
- Understand filling by count.
- Understand positive displacement filling.

313 Casing Machinery

- Understand cartoning machines.
- Understand casing machines.
- Understand uncasing and unscrambling.
- Understand cleaning and washing.
- Understand gathering machines.
- Understand strapping and stitching.
- Understand adhesives and their application.
- Understand labeling and coding.
- Understand maintenance and safety.
- Understand wrapping machines.

TPC Machine Shop Practices

315 Machine Shop Practices

- Name the two main classes of machine tools.
- Tell how to identify ferrous and nonferrous metals.
- Explain methods of identifying steels.
- Define the following terms: tensile strength, compressive strength, ductility, and malleability.
- Explain various heat treating processes used with metals.
- List the functions of a cutting fluid.
- Explain how to change sfpm to rpm.
- Describe the information you can gather from chip color and shape.
- Describe the tools commonly used for layout work in the machine shop.
- Explain the function of a surface plate.
- Define the terms bolt circle, pitch chord, and centerline.
- List the steps involved in laying out flange holes.
- Explain shop safety practices relating to eye protection, chip removal, and tool handling.
- Explain how to hold and drive work held between centers on a lathe.
- Explain how to hold lathe work in a chuck, and how to mount and remove a chuck from a lathe.
- Define the term swing as it relates to a lathe.
- Tell how to hold oddly shaped workpieces on a lathe.
- Explain when each of the following is used: collet chuck, steady rest, and follower rest.

- Explain how each of the following is used to hold work on a machine table: T-slot bolts and clamps, step blocks, V-blocks, C-clamps, angle plates, and planerjacks.
- Tell when and how to use a vise to hold a workpiece.
- List safety precautions for setup tools.
- Explain the importance of having a working drawing when machining a part.
- Define the terms section and sectional view.
- Name the three systems of dimensioning.
- Define the terms precision and tolerance.
- Define the term fit, and compare actual fit, clearance fit, interference fit, and transition fit.
- Name the simplest measuring tool in the shop.
- Explain how to hold and read a micrometer.
- Tell how to use a vernier caliper, sine-bar, and gaugeblocks.
- Describe the various materials used for tools.
- Identify the parts of a single-point tool.
- List important specifications for single-point cutting tools.
- Name the two basic types of grinders and explain how they are used to sharpen single point tools.
- Explain the standard marking system for grinding wheels.
- Describe the best way to grind carbide-tipped tools.
- Describe the construction of a twist drill, including identification of its parts.
- Explain how to perform the following operations when grinding: check the drill lips, check the relief angles, and thin the drill web.
- List the three categories of milling cutters based on the way they are mounted on a milling machine.
- Name the most common type of milling cutter for maintenance work.
- Explain how to grind end mills, counterbores, and reamers.

316 Machine Shop Turning Operations

- Describe the benefits and uses of the following reamers: shell, hand, adjustable, expansion, taper, high speed steel, and carbide tipped.
- Explain how to remove burrs from the cutting edges or teeth of a reamer.
- Define counterboring, countersinking, and spot facing.
- Describe and state the uses of the following threads: National, square, Acme, and Buttress.

- Explain how the sizing of pipe threads differs from the sizing of other threads.
- Explain when to use each of the following taps: plug, taper, bottoming, spiral-pointed, spiral-fluted, and fluteless.
- Tell why cutting fields are used in tapping operations.
- Explain how to deal with long chips when tapping.
- Explain the function of each of the following lathe parts: lathe bed, ways, headstock, tailstock, carriage, compound rest, and spindle.
- Name the two dimensions usually used to describe lathe capacity.
- List and describe several methods of holding work in a lathe.
- Explain the function of a steady rest and follower rest.
- Describe the factors to consider when selecting and preparing a piece of stock for a lathe job.
- Explain how to mount eccentric or irregularly shaped workpieces.
- Define the terms cutting speed and feed rate and list factors that affect each.
- Name two factors that affect the smoothness of a finishing operation.
- Explain the function of cutting fluid in lathe work.
- Identify the main parts of a twist drill.
- Explain the step-by-step procedure for drilling a hole.
- Demonstrate how to convert speed in surface feet per minute to inches per minute.
- Describe safety precautions to observe when working with a drill press.
- Describe the boring procedure and tell when it is used.
- Identify the main parts of a reamer.
- Tell what reaming method is best to use when a very accurate hole is required.

317 Machine Shop Shaping Operations

- List the steps involved in surface grinding.
- Name the most common and easiest-to-make gear.
- Explain how to select a shaper cutting fluid.
- Explain how shaper cutting speed is expressed.
- Name the five categories of grinding.
- Explain how to read the marking code on a grinding wheel.
- Explain how to mount a grinding wheel.
- Define the terms dressing and truing as related to grinding wheels.
- Explain how cutting fluids are used in grinding operations.
- Define grinding.

- Explain how to check alignment of the shaper vise and ram.
- Explain how cutting fluids are applied to planer work.
- Name the most widely used types of gears in plant machinery.
- Define the following terms: pitch diameter, circular pitch, diametral pitch, working depth, and face width.
- Explain how to check the first full tooth of a spur gear after cutting.
- Describe the pitch line of an involute rack.
- Explain how the teeth of straight bevel gears are cut.
- Explain when and why cutting fluid is required when using a power hacksaw.
- Explain how to select a power hacksaw blade.
- List at least three rules for good hacksawing.
- Contrast the operation of a hacksaw and a band saw.
- List the three factors involved in selecting the right band saw blade.
- Explain the important points of power sawing safety.
- Explain the difference between peripheral milling and face milling.
- List the four types of knee-and-column milling machines.
- Explain how each of the knee-and-column machines works.
- Explain how a workpiece is held on a milling machine.
- Name and describe the three basic styles of arbor.
- Explain how the speed of a milling cutter is measured.
- Define indexing.
- Compare and contrast shapers and planers.
- Explain the processes of shaping and planing.

319 Equipment Installation

- Tell who plans the installation of new equipment and list the steps involved.
- Tell which type of ground will support the most weight.
- Explain how steel rods are held in position when pouring a concrete footing.
- Name the best materials for filling around a foundation.
- Explain how to protect concrete that might come into contact with oil or chemicals.
- Tell how long new concrete must sit before equipment is installed on it.
- Define vibration and tell how it enters and leaves equipment.
- Tell what type of isolation is best to use on sensitive testing instruments.
- Explain how to isolate anchor bolts when mounting equipment on pads.
- Tell what type of wrench to use for tightening anchor bolts.

- Name the best tool for drilling anchor bolt holes in concrete.
- Explain why you must not use a concrete mix to grout anchor bolts.
- Explain the procedures involved in relocating existing equipment.
- Tell two things you must know before lifting equipment with a hoist.
- List three things to consider when selecting a jack.
- Explain the operation and uses of a roller skid.
- Tell where to find a floor's allowable load.
- Explain the correct way to handle a master precision level.
- Explain how to check the accuracy of a level.
- Name the greatest enemy of precision tools.
- Tell how to level V-shaped ways.
- Tell which leveling device is used most often on small equipment.
- Name three tools commonly used to check alignment.
- Tell how to set an alignment screw to prevent its movement.
- Explain how to test for the presence of moisture in electrical equipment.
- Tell what device is commonly used to prevent excessive pressure in a hot water heater.
- Explain the function of a pressure regulating valve.
- Tell the usual cause of excessive temperature during equipment startup.
- Define the terms foundation and footing.

323 Machine Shop Job Analysis

- Define surface grinding, its application, and the machines used.
- Define dimensional factors, including linear and angular dimensions.
- Compute tolerances and tolerance stackup.
- Describe allowance for finishing, including procedures for finish cuts.
- Compute surface texture in terms of an average used for final machining.
- Analyze surface finish requirements as specified for the job.
- Define machinability of workpiece stock, including machining variables, and workpiece variables.
- Explain machinability ratings.
- Select cutting fluids, cutting lubricants, and solid lubricants.
- Describe machining efficiency, including minimal workpiece setups and standard versus special tooling and fixtures.
- Identify the correct machine and cutting tool for a given job.

- Explain the procedures for turning single and multiple diameters, including shoulders, fillets, and relief notches.
- Show how to use the cutting tools and machines for knurling, filing, and polishing.
- List the procedures for facing chucked work and work mounted between centers on the lathe.
- Describe the procedures for boring and counterboring in a lathe and boring mill.
- Describe the basic drilling process.
- List drilling procedures for work mounted in a lathe.
- List drilling procedures for work mounted in a drill press.
- Explain the use of reaming in a lathe and a drill press.
- Explain the use of honing and the type of equipment used.
- Describe the basic milling process, cutter types, and their application.
- List slotting procedures in a milling machine.
- Define shaping, its tooling, and its relationship to planing and milling.
- Define broaching, its application, and the machines used.
- Compute tapers, including the use of the setover method, compound rest method, and taper attachment method.

324 Lathe-Turning Work Between Centers

- Install a faceplate and lathe dog in a lathe.
- Select and mount a cutting tool for facing the ends of a workpiece.
- Explain how the optimum speed and feed are selected.
- Face the ends of the workpiece.
- Align the cutting tool with the workpiece.
- Take a trial cut on the workpiece.
- Rough turn the workpiece.
- Finish turn the workpiece.
- Chamfer edges of the workpiece.
- Describe how to lay off shoulders using the caliper, scribe, and parting tool methods.
- Turn a filleted shoulder on the workpiece.
- Explain how to notch a workpiece with a parting tool.
- Knurl the workpiece.
- Perform a polishing and filing operation between centers.
- Prepare and mount the workpiece.
- Describe screw thread features.

- Explain in detail how threads are cut on a lathe.
- Set the thread cutting speed and use the thread dial indicator.
- Determine the total depth of cut and take a trial and finish cut on the workpiece.
- Designate standard types of tapers as well as calculate special tapers.
- Explain how to turn a taper using the tailstock setover method.
- Describe how to turn a taper using a taper attachment.
- Turn a taper using the compound rest method.
- Tell how to use the dial test indicator and vernier bevel protractor for close tolerances.
- Describe how to select a work mounting method.

325 Lathe-Machining Work in a Chuck

- Hold work on an angle plate.
- Mount work on the lathe carriage for boring.
- Face a shoulder.
- Select and install a boring bar and bit.
- Select the speed and feed for boring and counterboring.
- Make a trial cut.
- Rough bore and finish bore a workpiece.
- Counterbore a workpiece.
- Select, install, and align a thread-cutting tool.
- Machine internal threads in a workpiece.
- Check finished threads.
- Bore a taper using the compound-rest method.
- Use faceplate clamps and jaws.
- Bore a taper using the taper-attachment method.
- Mount and true a faceplate.
- Select and install a chuck.
- Install and center work in a chuck.
- Use a 3-jaw and 4-jaw chuck.
- Use a collet chuck.
- Use a mandrel.
- Select, install, and align both a facing tool and a turning tool.
- Set the correct speed and feed for facing and turning.
- Rough turn a workpiece.
- Finish turn a workpiece.

326 Basic Milling Procedures

- Select, set up, and align straddle milling cutters on a Style Barbor.
- Straddle mill a workpiece.
- Cut an angular step using a side milling cutter.
- Face the side of a workpiece with a shell end mill.
- Face a broad workpiece surface using a face mill.
- Select and install a standard Woodruff keyseat cutter.
- Mill a keyseat with rounded ends (for a square key) and a Woodruff keyseat (for a Woodruff key) in a workpiece.
- Make a plunge cut with a two-fluted end mill.
- Mill a square on the end of a shaft.
- Mill a tang and a flat on a cylindrical workpiece.
- Use a T-slot cutter in both a horizontal and vertical spindle position.
- Angle mill a bevel from both a horizontal and vertical spindle position.
- Cut a female dovetail in a workpiece using a dovetail cutter.
- Use adapters for shank-type cutters.
- Identify the major parts of a universal horizontal milling machine and their functions.
- Define the use of a vertical milling attachment.
- Compute the milling spindle speed and the machine table feed rate.
- Install and align a workpiece in a V-block.
- Install and align a workpiece in a milling machine vise.
- Select and install a slab milling cutter on a Style B arbor.
- Install a Style B arbor with cutter, spacers, key, and bearing sleeve into a horizontal milling machine.
- Complete a rough slab milling cut on a workpiece.
- Complete a finish slab milling cut on a workpiece.
- Mill a slot with the cutter in a horizontal and a vertical spindle position.

327 Indexed Milling Procedures

- Describe indexing and its uses.
- Identify the parts of a dividing head.
- List the four types of indexing you can do with a dividing head.
- Explain how to use sector arms to index fractions of a turn.
- Select the right index plate for the job.
- Mount a dividing head on a milling machine table.

- Mount work between a dividing head and footstock.
- Mount work in a dividing head chuck.
- Index and side mill or straddle mill a hexagonal workpiece.
- Use the dividing head to index a series of holes in a circle.
- Index spur gear teeth on a gear blank.
- Use formulas to compute gear tooth dimensions.
- Select the correct cutter for specific spur gear tooth dimensions.
- Explain how to use a rotary table.
- Use the measuring over pins technique to check the dimensions of gears.
- Define the terms helix, helix lead, helix angle, and helix pitch.
- Use change gears to vary the lead of the milling machine.
- Describe the purpose of idler gears.
- Compute the lead of a helix.
- Index and mill helical teeth on a cutter.
- Index and mill helical gears
- Describe positive and nonpositive cam systems.
- Define radial cam terms such as cam lobe, uniform rise, cam rise, and camlead.
- Mill a uniform-rise cam.
- Mill a short-lead cam.
- Mill a multilobe cam.
- Explain how to use the incremental-cut method to mill a nonuniform rise cam.

328 Multiple-Machine Procedures

- Demonstrate how to set a workpiece perfectly level on a drill press table.
- Demonstrate how to select the correct speeds and feed rates for a drill press.
- List four specific uses for a horizontal shaper.
- Describe the safety precautions to be taken when working with or around a shaper.
- Demonstrate how to mount a block-shaped workpiece in a shaper vise.
- Explain how to calculate and set the proper stroke rate on a shaper.
- Demonstrate how to set length of stroke and correctly position the ram over the workpiece.
- Demonstrate how to indicate-in on a horizontal shaper.
- Explain the purpose of a surface grinder.
- Demonstrate how to dress and true a grinding wheel.

- Demonstrate how to set up a workpiece on a surface grinder, and grind its surfaces to specified dimensions.
- Explain the purpose of a cylindrical grinder.
- Demonstrate how to set up a workpiece between centers on a cylindrical grinder.
- Describe the processes of traverse grinding, plunge grinding, and bumping the shoulder.
- Calculate the rpm settings for the wheel of a cylindrical grinder and for the workpiece, given the sfpm.
- Describe safety procedures for both types of grinders.
- Describe three different types of horizontal boring mills.
- Explain the purpose of a rotary table, a line boring bar, slot blocks, a drawbolt, and a continuous-feed (cross-slide) head.
- Explain how a boring bar is aligned on center of an existing hole in the workpiece.
- Describe how a facing operation works on a horizontal boring mill.
- List the three main types of power saws commonly used in maintenance machine shops and describe their appropriate uses.
- Explain the primary difference between a hacksaw and a bandsaw.
- Demonstrate how to install the band on a horizontal bandsaw.
- Demonstrate how to set up a workpiece and make a cut on a horizontal bandsaw.
- Describe the safety precautions to be taken when working with a vertical bandsaw.
- Explain how to make an internal cut using the vertical bandsaw.
- Demonstrate how to reweld the band of a vertical bandsaw.
- Name three types of drilling machines in common machine shop use.
- List the main features of a sensitive drill press.
- Describe the factors used to select the best drill for a given job.
- Describe correct, safe practices for changing drill bits.
- Explain how to achieve the most efficient order of drill press operations.

TPC Maintenance Supervisor

901 Maintenance Organization

- Describe the uses of labor control information.
- Calculate manhour performance indexes.
- Explain the role planning plays in reducing downtime costs and improving manpower use.
- List the five steps of the decision-making process.

- Define goals, objectives, policies, procedures, and programs in the context of maintenance planning.
- Describe the role of the maintenance planner.
- List six areas in which planning enhances labor use.
- Explain why standards are used.
- Describe quality and quantity standards and their uses.
- Define standard terms of the maintenance supervisor's vocabulary.
- Describe the use of the maintenance work order.
- Explain the importance of job priorities.
- Identify two basic types of work standards.
- Distinguish between the uses of the engineering work order and the maintenance work order.
- Describe the uses of the master schedule and the PM work order.
- Explain the importance of using information sources.
- List the types of information that originate within the maintenance department and from other sources.
- List the elements that must be considered when developing a computer-based information system.
- Describe the functions of the first-line supervisor, the middle-level supervisor, and the top-level supervisor.
- List some of the common problems that lead to difficulties in operating a maintenance department.
- Outline the differences among functional organizations, area organizations, and the centrally controlled maintenance organizations.
- Explain the chain of command of a company using its organizational chart.
- Identify the elements that make employees resistant to reorganization, and what can be done to counter this resistance.
- Describe the way the first-line supervisor's position fits into the overall maintenance system.
- List five types of written orders that can be used for assigning work.
- Classify different kinds of repairs and list them in proper order of importance.
- List the duties of the maintenance planner and the maintenance engineer as they relate to the duties of the first-line supervisor.
- List five conditions a maintenance department must meet in order for standards to be workable.

- Describe how different types of standards are developed.
- State how the backlog can be analyzed to evaluate the makeup of the workforce.
- Describe the function of the computer in maintenance information management.
- List the types of information that should be stored in a computer.
- List types of data processing support available to maintenance departments.
- Use basic computer terminology.

902 Implementing Preventive Maintenance

- Report labor and material use.
- Explain the role forecasting plays in planning and scheduling.
- List short cuts for obtaining spare parts and other materials that are often used in routine repairs.
- Estimate crew labor necessary for efficient job execution.
- Describe the supervisor's role at the worksite in terms of labor control, accident prevention, and quality control.
- Explain the role of quality control.
- Describe the steps involved in evaluating a completed job.
- Describe the techniques for controlling emergency, scheduled, unscheduled, and preventive maintenance work.
- List the types of jobs that should appear on a weekly schedule.
- Explain how and why weekly scheduling meetings should be held.
- Measure compliance with scheduling.
- Describe the function of the maintenance job order.
- List the criteria for assigning emergency status to a situation.
- Describe the use of the master schedule and standing work order.
- List the six functions of a typical PM program.
- List the major benefits of PM.
- Explain the three stages involved in the planning process.
- Explain the use of a priority system.
- Describe the elements needed to establish a preventive maintenance program.
- List the data that can be obtained from review of inspection reports.
- Distinguish between preventive and predictive maintenance.
- Explain the preparation of inspection checklists.
- Explain how to set up a lubrication program.
- Describe the importance of scheduling to the maintenance program.

- Describe the role that the production department plays in maintenance scheduling.
- Explain the uses of forecasting and long-range planning.

903 Controlling Maintenance Resources

- Describe the differences in labor control between shop and field work.
- Describe the role played by a shop that supports a field crew.
- List the steps required to rebuild parts.
- List the advantages and disadvantages of central and area shops.
- Explain how shop location, layout, and configuration affect work.
- Describe the effect increased productivity has on maintenance costs.
- List the uses of a budget.
- Describe zero-base budgeting.
- Describe factored budgeting.
- List the eight steps in formulating equipment repair projections.
- Explain the reason why all maintenance work should be approved before it is performed.
- Define workload and explain its importance in control of maintenance work.
- List the seven workload categories.
- Compute workload measurements for each of the seven categories.
- Explain how the workload should be distributed.
- Describe the effects of absenteeism and overtime on the workload.
- Identify the seven categories of maintenance labor discussed.
- Describe the most effective means of controlling each of the seven categories of maintenance labor.
- Explain the effect a well-executed PM program has on other maintenance work.
- State the leading factors contributing to absenteeism.
- Determine the breakdown point between overtime and hiring additional workers.
- Schedule vacation periods so that production still proceeds smoothly.
- Explain the importance of effective material control to maintenance work.
- Describe the duties of the material controller.
- Describe the operation of a typical manual inventory control system.
- Calculate economic order quantities and reorder points.
- Operate a two-bin inventory control system.

904 Improving Performance in Maintenance

- List the various forms in which training materials are available.
- Recognize the importance of ongoing safety training.
- Give examples of how to conduct effective training sessions.
- Identify the roles that motivation, competition, and performance evaluation play in training crew members.
- Describe the influence that the quality and amount of supervision has on crew productivity.
- Explain the importance of setting deadlines and using progress reports.
- Indicate the importance of delegating work.
- List procedures a supervisor can follow to increase his or her own productivity.
- List the 15 factors that influence the success of any maintenance improvement effort.
- Recognize the importance and use of the maintenance concept.
- Trace the importance and use of the maintenance objective.
- Explain the importance and formation of maintenance policies.
- Identify the development and role of maintenance procedures.
- Give examples of the different interest levels of key maintenance personnel.
- Compute annual productive hours per worker.
- Compute cost per productive hour.
- List indicators that can help a supervisor control costs.
- Tell how performance trends are established.
- List factors that adversely affect maintenance labor utilization.
- List factors that have an adverse effect on maintenance labor effectiveness.
- Describe the roles of the supervisor in improving labor productivity.
- State how and why random sampling and work sampling are conducted.
- Describe the first-line supervisor's role in training crew members.

905 Effective Communication for Supervisors

- List techniques used in prewriting.
- Tell how to determine the purpose for writing.
- Explain why it is crucial to know the audience.
- Give examples of a writer's point of view.
- Describe how to organize a written piece.
- Explain the importance of syntax.
- Compare the passive voice with the active voice.

- Recognize parallel structure.
- Identify the different types of punctuation.
- Give examples of comma usage.
- Give examples of memo, letter, and report format.
- Explain how to use and write a memo.
- Explain how to use and write a letter.
- Explain how to use and write a report.
- Explain how communication works.
- Explain how to use the various communication tools.
- Give examples of effective telephone use.
- Tell how to give and receive instructions effectively.
- Demonstrate effective interview techniques.
- Describe the importance of context in communication.
- Describe how a receiver's background affects the message.
- Define and give examples of nonverbal language.
- Describe ways to improve vocabulary.
- Explain the importance of precise word choice.
- Tell how to be a good listener.
- Explain what makes a poor listener.
- Give techniques for identifying problems through good listening.
- Explain the importance of getting feedback.
- Show how to ask questions and paraphrase.
- Give techniques for developing a management vocabulary.
- Tell how to check and maintain language skills.
- Show how to make sure instructions are clear.
- Explain how communication can motivate a crew.
- Give techniques for improving listening as a supervisory skill.

906 Employee Relations

- Tell why it is important to rehearse testimony before a hearing.
- Discuss ways to avoid problems leading to grievances.
- Describe ways of dealing with fighting among employees.
- List the steps of progressive discipline.
- Recognize the types of evidence you should or should not use to support your corrective action measures.

- Explain how to deal with absenteeism and other forms of lost time.
- List the factors that must be considered when correcting employees who have damaged company property.
- Identify the factors that must be considered when enforcing safety and health rules.
- Recognize the types of false statements workers might make.
- Explain a supervisor's responsibilities with regard to a grievance procedure.
- Explain the importance of a no-strike/no-lockout clause.
- Describe the various steps involved in a grievance procedure.
- Explain how to deal with horseplay.
- List the elements of the supervisor's administrative duties.
- Calculate workload.
- Explain why a strong preventive maintenance program is desirable.
- Calculate crew efficiency.
- Explain the values and uses of counseling, progressive discipline and training.
- Calculate productivity.
- List the elements of the supervisor's job-related duties.
- Explain the importance of safety and comfort in the workplace.
- Explain the importance of further training both to crew members and in terms of increased productivity.
- Describe the effect that a supervisor's good attitude can have on crew members.
- Describe the effect that dishonesty, incompetence, or indifference has on crew members.
- Explain the need to encourage the full participation of employees and methods for obtaining the participation.
- Describe positive leadership style.
- Explain how a supervisor can win the respect of his or her employees.
- List several things to consider when determining corrective action measures.
- Explain how good labor relations affect productivity.
- List several characteristics of a successful leader.
- Explain why it is important for a supervisor to be directly involved with employees.
- Give examples of different leadership styles.
- Identify the functions of labor unions and company management.
- Tell what to expect and what not to expect from union representatives.
- Define insubordination.
- Give examples of refusals to comply with orders and explain how to deal with such acts.

- Describe instances in which employees fail to follow directions, along with the appropriate corrective action.
- Explain how to deal with threats, obscene language, and physical assault.
- Describe the processes used to select arbitrators.
- List ways a supervisor can help a company prepare for an arbitration hearing.
- Explain the supervisors' responsibilities in relation to equal employment opportunity.
- Name the basic labor law of the United States and two Acts that amended it.
- List the functions of the National Labor Relations Board.
- Give examples of unfair labor practices.
- Explain how an unfair labor practice charge is handled.
- State an employer's basic responsibility under the Occupational Safety and Health Act.
- Explain what happens if an employer fails to comply with OSHA standards.

907 Managing a Training Program

- Name three distinct kinds of training.
- Explain why good communication is important in training.
- Define training and state the main reason for training today.
- Explain the problems involved with trial-and-error learning.
- List three important steps in administering training.
- Explain the steps involved in a front-end analysis.
- Tell why it is important to write performance objectives.
- List the advantages, disadvantages, and applications of self-paced and group-paced training.
- List several important aspects of the training environment and tell why each is important.
- Explain several group management techniques.
- Name at least three advantages of supervised self-study.
- Explain the importance of determining the level of your training needs.
- Evaluate the suitability of commercially prepared training programs.
- List at least six factors that influence the usefulness of a training media.
- Name several types of visual aid and explain how each can be used to improve a lecture.
- Explain how to put together a useful sample set.
- Trace the steps involved in making of a computer slide show.
- List several advantages of DVDs over videotapes.

- Give the main reason programmed instruction is effective.
- Describe the usefulness of computers in training.
- List several reasons for keeping training records.
- Name the three types of training records that are important to keep.
- Explain how time standards are established and how they can be used to measure performance.
- Name three common training evaluation methods and explain the applications of each.
- Give examples of five types of written test questions and give advantages and disadvantages of each type.
- Tell why an on-the-job checklist is an important evaluation tool.
- Describe the purpose of a questionnaire.

TPC Mechanical Maintenance Applications

341 Mechanical Drive Maintenance

- Describe how to align parallel shafts, intersecting right-angle shafts, and nonintersecting right-angle shafts.
- List the three general types of belt drive and explain how they work.
- Tell how sheaves and pulleys are mounted and aligned on their shafts.
- List four types of chain drives.
- Describe the procedure for aligning the driving and driven shafts.
- Distinguish between bored sprockets and bushed sprockets and tell how each is mounted.
- Tell how a drive chain is mounted on the sprockets.
- List four methods of lubrication for chain drives.
- Explain both no-load and full-load test running procedures.
- Describe the causes of fatigue breaks, tensile breaks, rapid chain wear, roller wear, and side plate spreading.
- Explain why open gearing requires special provisions for feeding lubricating oil to its parts.
- Differentiate between the way positive-drive belts and other types of belt transmit power.
- Explain why all the belts in a multi-belt drive must be replaced at the same time.
- List three ways of splicing the ends of a flat belt together.
- Describe two ways of taking up slack in a stretched V-belt.

- Describe the appearance and causes of wear, abrasion, corrosion, scoring, pitting, spalling, cold flowing, fatigue breaks, and cracked rims and webs.
- Tell how an enclosed gear drive should be mounted on the floor.
- Tell how an enclosed gear drive should be mounted on the framework of a driven machine.
- Explain what should be done during the initial run-in, the one-week check, and the thirty-day check.
- Describe the two methods of lubrication used in enclosed gear drives.
- List four steps you should take to protect an enclosed gear drive that is to be put in storage.
- Identify typical nameplate data.
- List three purposes of a coupling.
- Calculate shim thickness required to align couplings in an angular plane.
- Distinguish between couplings that need lubrication and those that do not.
- List the three basic types of coupling.
- Describe how shaft couplings, spacer couplings, floating shaft couplings, and universal joints are installed.
- Explain how to check both the angular and the parallel alignment of shafts.
- Tell how a dial indicator is used in precision coupling alignment.
- Describe the procedure for aligning worm gearing.
- List some of the problems a visual inspection of gearing can uncover.

342 Mechanical and Fluid Drive Systems

- Explain how friction-type and jaw-type clutches differ in construction.
- Name the precautions that should be taken when mounting body on a shaft.
- Explain how to test-run a mechanical clutch with no load.
- Describe the steps to be taken when troubleshooting a drive system.
- Explain how to install a mechanical brake.
- Describe the results of improper alignment between driving and driven shafts.
- Identify the problems that may be indicated by chatter and excessive noise.
- Describe how single-disc and multiple-disc friction clutches operate.
- Explain how the principle of hysteresis is applied in electric clutches.
- List the three basic components of magnetic particle clutch.
- Differentiate between the static torque, pickup torque, and average torque of a clutch.
- Identify the problems that may arise in a clutch if its heat is not dissipated.

- Define decay time, pull-in time, and response time.
- List the precautions necessary to provide extra protection for open-type drives.
- Describe how to install an enclosed-type drive on a concrete floor.
- Explain how to prepare the shafting when installing a new enclosed drive.
- Describe the initial lubrication of new adjustable-speed drives.
- Describe how to test-run an adjustable-speed drive under no load and full load conditions.
- Name some of the safety rules for working on an adjustable drive.
- Explain how a fluid drive works.
- Describe how constant-speed couplings differ from variable-speed couplings.
- Trace the fluid path through a torque converter using either a drawing or a cutaway.
- Describe the various ways of mounting a fluid coupling.
- Explain how to cool the fluid in large couplings.
- Discuss preventive maintenance procedures for couplings.
- List the components used in a typical drive system.
- Name the part of a drive system in which most of the speed reduction occurs.
- Describe the construction and operation of a shaft-mounted drive.
- List the protective devices for a drive.
- Explain the proper maintenance procedures for a drive system.

343 - Installing and Replacing Bearings and Shaft Seals

- Discuss shaft alignment and describe bearing design factors that compensate for misalignment.
- List factors to consider when selecting bearing lubricants for pillow blocks.
- Name the major components of a ball bearing screw.
- Explain why most bearing/shaft assemblies have one free and one fixed bearing.
- Name the important dimensions of a plain bearing.
- State the source for learning the proper running clearance in a plain-bearing installation and describe how to measure running clearance.
- State the characteristics of bearing and linear material and explain how they influence the choice of bearing for a given application.
- Discuss the steps involved in fabricating a poured babbitt bearing liner and obtaining the correct finished-bore dimensions.
- State the purpose and general principles of plain-bearing installation.
- Identify the symptoms of bearing trouble and describe how to remedy each situation.

- Describe proper procedures in handling, storing, cleaning, and inspecting antifriction bearings.
- Explain how to measure, inspect, and condition a shaft bearing seat prior to installing a new bearing.
- Tell where pressure should be applied to force a ball bearing on a shaft.
- Name the two dimensions that are important in mounting a tapered-bore bearing on a shaft.
- Describe the steps involved in correctly seating an antifriction bearing.
- Describe the steps to take when using a hot-oil bath to heat a bearing for mounting.
- Name the three major signals of bearing failure in antifriction bearings.
- Describe the correct procedures for removing bearing seals and retaining devices from a bearing assembly.
- Describe the impact bearing removal technique.
- Explain how to use an aluminum heating ring to mount and dismount the inner ring of a cylindrical roller bearing.
- Discuss the steps involved in inspecting and cleaning used bearings.
- Describe the procedures for remounting sound used bearings.
- Explain how to replace a shaft seal.
- List the safety precautions that are essential to working with bearings.
- Name the three major types of housings or mounts for bearings.
- Name the major components of a mounted antifriction bearing.
- Describe the two basic types of bearing seals and name the advantage of each.
- List the different methods of securing insert bearings to the shaft and describe the mounting methods involved.
- Describe the major differences between a ball bearing screw and an acme screw.
- Describe the main purpose of a ball bearing screw and give an example of a typical application.
- Describe the installation procedures for a ball bearing screw.
- Name the differences between contact and labyrinth seals and explain what creates the sealing action in each.
- List the factors that determine the choice of shaft seal.
- Describe how to install a lip seal on a shaft, including shaft preparation.
- Name the major problem that arises with lip seals and list at least four conditions that can cause it.

344 - Pump Installation and Maintenance

- Describe how to make a new housing gasket.
- Identify the differences between the different types of rotary pumps.
- Trace the path of fluid through a rotary pump.
- Identify the major problem areas in a rotary pump.
- Explain how to troubleshoot some of the common problems of rotary pumps.
- Create a maintenance schedule for inspections and a record-keeping log.
- Compute the amount of work done when giving values for force and distance.
- Name the two types of energy.
- Check a pump's capacity by determining the NPSHA of the system.
- Compute the brake horsepower required to drive a pump under given conditions.
- Explain how to prime a fluid-handling pump.
- Identify the two major functions of packing and seals.
- Explain the selection and installation of packing rings on a pump shaft.
- Identify the components of typical mechanical seals.
- Name at least three advantages of mechanical seals overpacking.
- Describe how to install a mechanical seal on a pump shaft.
- Discuss the care and maintenance of packing and seals.
- Explain how to align and level a pump on its base.
- Explain the needs for and uses of auxiliary pump drives.
- Identify the major symptom of faulty packing.
- Identify the major symptom of cavitation on a pump impeller.
- Describe the procedures involved in disassembling, inspecting, reassembling, and reinstalling a centrifugal pump.
- Explain how to check the runout of a pump shaft.
- Explain how to check the clearances between stationary rings and the impeller or rotating rings.

345 Maintenance Pipefitting

- Name the materials used for plastic pipes and fittings.
- Given a length of pipe and a slip-on flange with a raised face, align and weld the pipe and flange.
- Given two lengths of thermosetting plastic pipe, demonstrate how to join them with a bell and spigot joint.
- Name at least one limitation of plastic piping.

- Demonstrate how to align and install fittings on a length of plastic pipe.
- Name the three classes of piping supports and hangers.
- Explain which two types of pipe hangers are most often used to reduce line vibration and shock.
- Explain the factors to be considered when installing pipe hangers for different applications.
- Name the piping system components used to compensate for pipe length changes due to temperature changes.
- Explain the factors to be considered when locating (spacing) pipe hangers in a system.
- Name two types of steam traps and identify the major consideration in locating them.
- Explain the purpose of a line filter.
- State whether ID or OD identifies a given nominal pipe size.
- Given a nominal pipe size and a copy of the American Standard Code for a Pressure Piping, find the wall thickness of a pipe of a given schedule number.
- Name a least four kinds of pipe fittings
- Given a schematic drawing of a piping system, identify all fittings used in the system.
- Given a drawing showing three lengths of pipe with and without fittings installed, correctly name the application dimension for measuring the pipe length.
- Given a schematic drawing showing two parallel horizontal pipe runs with a 45° run connection, identify the travel, set, and face-to-face length.
- Given a descriptive number, identify the pipe size, thread type, and number of threads per inch on a threaded pipe.
- Given a length of unthreaded pipe and required thread specifications, thread one end of the pipe to meet the specifications.
- Given a length of threaded pipe and two threaded fittings, prepare the parts, apply the proper compound, and assemble the components.
- State the important parts of a pipe thread.
- Given actual dimensions for travel and set of a threaded pipe and fitting assembly, use established dimensional tables to compute the total length of replacement pipe needed.
- Explain what steps to take to prepare lengths of pipe for butt and fillet welding.
- Name the welding ring material used with stainless steel or nickel alloy piping.
- Explain squareness and its importance in a welded piping system.
- Name the major assembly considerations when fabricating flanged connections for a rolling offset installation.

- Given a schematic drawing of this installation, compute the hole compensation angle to be used when positioning the flange for welding.
- Name at least one accessory used to help align two sections of pipe for welding.
- Name the two most common materials used to make thermosetting plastic pipe.
- Name at least one advantage of plastic piping.

346 - Tubing and Hose System Maintenance

- Describe the application of sealants and adhesives in gasket joints.
- Describe maintenance and troubleshooting procedures for hydraulic tubing systems.
- Discuss the three most common applications for hoses in industry.
- Describe hose fitting classifications and installation techniques.
- Explain how to calculate hose lengths for bends.
- Describe the methods of testing, inspection, and maintaining hose.
- Identify the types and uses of gasket materials.
- Name the critical dimensions of a flanged pipe joint gasket.
- List and explain the three characteristics of contact surfaces.
- Explain the uses of gasket coatings, tapes, and strips.
- List the properties and typical uses of various types of fittings.
- Explain the procedures involved in soldering and brazing.
- Name several types of flaring tools and explain how they are used.
- Explain how to install flared and flareless fittings.
- Tell how and why tubing systems should be well supported.
- List common causes of tubing system problems and their solutions
- Explain the principles of force, pressure, and area as applied to hydraulics.
- Discuss hydraulic fluids, hydraulic circuits, and hydraulic line components.
- Explain how to select the proper tubing and fittings for hydraulic systems.
- Compare and contrast tubing and pipe.
- List factors to be considered when selecting tubing for a specific application.
- State a common application of various tubing materials.
- Describe various fittings and tell how to select the proper fitting for a given tube.
- Tell why is it sometimes necessary to anneal tubing.
- List the steps to follow when cutting, sawing, and deburring tubing.
- Explain how to calculate tubing length accurately.
- List the steps involved in bending a given length of tubing.
- Define the service conditions that must be taken into account when selecting tubing.

347 - Valve Maintenance and Piping System Protection

- Discuss the installation, inspection, and maintenance of insulation and other forms of piping system protection.
- Discuss the factors that affect the selection of valve materials.
- Describe the various methods of connecting valves to piping.
- Identify the various types of common valves and the operating characteristics of each.
- Explain general maintenance and repair procedures for different types of valves.
- Identify several types of special valves and the operating characteristics of each.
- Discuss the installation, maintenance, and repair of special valves.
- Explain the function and operation of a valve actuator.
- Identify various types of valve actuators and describe the installation, maintenance, and repair of each.
- Discuss the operating characteristics of various accessories, including gauges, meters, accumulators, and air receivers.
- Name the five major uses of valves in piping systems and identify the types of valves best suited for each.
- Identify and explain the factors that determine the selection of a valve for a given application.
- Identify various valve markings and symbols.
- Describe several types of valve-to-pipe connections.
- Discuss the selection and proper use of tools in valve installations.
- Explain the importance of the correct installation of valves in well-chosen locations.
- Describe the methods by which heat transfer occurs.
- Discuss the methods of tracing process lines.
- Explain the various methods of protecting piping systems from heat, cold, and corrosion.

TPC Mechanical Systems

301 Basic Mechanics

- Differentiate between kinetic and potential energy, and give an example of each one.
- Define power and horsepower, and tell how each is measured.
- Define pressure and identify common units of pressure measurement.
- Define a fluid.
- Explain the difference between gauge pressure and absolute pressure.
- State Pascal's Law and give an example of its application.

- Explain the Bernoulli Effect and give three examples of how it is utilized in industry.
- Identify and name six types of simple machines.
- Explain how a siphon works.
- Calculate the ideal mechanical advantage of each of six simple machines.
- Describe the action and purpose of cam-and-follower mechanisms.
- Determine the ideal mechanical advantage of several simple gear trains.
- Explain mechanical efficiency and show how to calculate it.
- List the four classifications of mechanisms.
- Explain the functions of bell cranks, Pitman arms, and toggle bars.
- Name three types of four-bar linkages and explain how they function.
- Explain the advantages of having a well-organized tool box.
- State three precautions to take before using any power tool.
- Describe the potential electrical hazards associated with electric power tools.
- State three general guidelines for the safe operation of any portable power tool.
- Describe the safe use of each of the following power tools: electric drills, sanders, grinders, and saws; electric impact tools; pneumatic impact wrenches and hammers.
- Identify seven major types of threaded fasteners.
- Read and interpret common screw thread and threaded fastener specifications.
- Describe the three actions in a manual riveting operation and explain why each action must be done properly.
- Demonstrate the proper technique for safety wiring a group of threaded fasteners.
- Identify three kinds of washers.
- Define friction, identify the forces that cause it, and describe its effects.
- Differentiate between static friction and kinetic friction.
- Define coefficient of friction.
- Calculate the expected friction force between two surfaces, given the normal force and the coefficient of friction.
- Describe four types of wear.
- List the basic measurement instruments most often used in mechanical maintenance, and describe the operating principles of each.
- Name the major hand tools used in maintenance.
- State criteria for selecting the proper tools for specific jobs.
- Identify safe/unsafe practices in the use of hand tools and explain why they are safe/unsafe.
- Name the six basic motion conversions and give an example of each.

- Describe the ratchet-and-pawl mechanism.
- Define measurement, parameter, accuracy, precision, sensitivity, and range.
- Explain why measurements are important to maintenance operations.
- Describe the general features of a portable measurement instrument.
- Explain how to prolong the useful life of selected hand tools.
- Name five ways forces originate.
- Explain how forces are measured.
- Define velocity, acceleration, and elastic distortion.
- Define rotary motion and reciprocating motion.
- State and explain Newton's Laws of Motion.
- Define work, and explain how to calculate it.
- Define the terms torque and prime mover.
- Define energy, and tell how it is measured.

302 Lubricants and Lubrication

- Define lubrication and describe the four forms of lubricants.
- Discuss the characteristics of static, kinetic, fluid, and rolling friction.
- Explain how manual and drip lubrication methods work.
- Describe the operating principles of natural and pressure lubrication methods.
- Describe a typical positive-feed oil lubrication system.
- Compare three types of sight-glass flow indicators.
- Describe types and operation of various spray nozzles and valves used in automatic lubrication systems.
- Compare the operation of header and progressive metering systems.
- Explain the importance of proper lubricant storage and describe good inside and outside storage practices.
- Describe various methods of dispensing lubricants.
- Discuss proper inventory and stock rotation procedures and define lubricant purification and reclamation.
- Explain how gravity separation, centrifuges, strainers, and filters work.
- Explain the importance of good lubrication management practices and describe seven different kinds of information that should be included on an equipment lubrication survey form.
- Explain how to set up an oiler route and how to color-code the lubrication points.

- Discuss the considerations involved in establishing and installing a computerized lubrication program.
- Describe the purposes of several types of basic computer lubrication forms and list advantages of expanded programs.
- Explain how a lubricant reduces wear and dampens shock.
- Discuss the cooling action of lubricants and explain how they prevent corrosion.
- Explain the importance of a lubricant's sealing action and explain how it works.
- Describe how lubricating oils are obtained and processed and briefly discuss the chemistry of petroleum.
- Explain how viscosity is rated and measured in lubricating oils.
- Explain how flash point, fire point, pour point, oxidation resistance, and emulsification affect a lubricant.
- Describe the five major properties of greases.
- Name four factors that affect lubricant selection.
- Describe the nature and purpose of pour-point depressants, oxidation inhibitors, viscosity-index improvers, and antifoam agents.
- Explain how rust and corrosion inhibitors, extreme-pressure additives, and detergent-dispersants work.
- Discuss the use of emulsifying and demulsifying agents, oiliness and antiwear agents, tackiness agents, and other additives.
- Describe the differences between mixed-film, boundary, and full-film lubrication.
- Discuss elements which determine proper bearing lubricant selection.
- Identify common bearing lubrication problems and ways to avoid them.
- Describe the four types of oil bases.
- Name three types of circulating oils and describe their properties.
- Compare the characteristics and uses of gear oils, machine oils, and spindle oils.
- Discuss the special properties of refrigeration oils, steam cylinder oils, and internal combustion engine oils.
- Define grease and compare the advantages of using greases and using oils.
- Describe methods for making grease and compare the uses and properties of at least five soap-based greases.
- State the advantages and disadvantages of using nonsoap-based greases.
- Discuss grease selection and application for plain and antifriction bearings.
- List three purposes for grease additives and explain how extreme-pressure greases accomplish their purpose.

- Compare uses and characteristics of water-repellent and high- and low-temperature greases.
- Describe lamellar greases, giving an example, and list some special uses for silicone greases.
- Compare three types of dry-film lubricants and describe how and where to use them.
- Name four main considerations for selecting a lubrication system and explain the importance of each.

303.1 Power Transmission Equipment

- List the factors that affect the power transmitted by a belt drive.
- Name the main components of a belt drive.
- Explain the differences between chain drives and belt drives in transmitting power.
- Explain how a roller chain drive works.
- Describe the construction of offset roller chain.
- Explain the differences between sprocket types A, B, and C.
- List the steps in installing a chain drive.
- Define the following terms used to describe gear drives: pitch circle, pitch diameter, working depth, tooth face, tooth flank.
- Calculate the diametral pitch of a gear.
- List advantages and disadvantages of helical gears.
- Explain the differences between herringbone gears and double-cut helical gears.
- Define the following terms used in discussing worm gears: worm lead, worm lead angle, normal worm pitch, worm axial pitch.
- Explain how additional speed reduction can be obtained with shaft-mounted gear drives.
- Describe a worm-gear drive and a miter-gear box.
- Give a general explanation of gear drive installation and maintenance.
- Define mechanical power, thermal power, and overload capacity.
- Explain what determines the service factor of a gear drive.
- Describe a concentric-shaft gear drive and a right-angle-shaft gear drive.
- Explain how parallel-shaft gear drives are lubricated.
- Identify the main criteria for selecting adjustable-speed drives for industrial plants.
- Explain the operation of a variable-speed belt drive.
- Describe how to control variable-speed drives.
- Describe the belts and chains used for variable-speed drives.

- Explain the operation of a roller-type variable-speed drive.
- Determine the corrections needed to align two machines, using the reverse-indicator method.
- Determine the corrections needed to align two machines, using the face-rim indicator method.
- Determine the corrections needed to align three machines on a common centerline.
- Determine the corrections needed to align two machines separated by a long floating shaft.
- State at least three advantages of using laser alignment equipment over using dial indicators.
- List three functions usually performed by a coupling.
- Describe two types of jaw couplings.
- Name an application for molded rubber couplings.
- State an advantage of chain couplings.
- Explain the operation of a shear-pin coupling.
- Describe a torque-limiting coupling.
- Name an application that involves a floating shaft.
- Explain the reason for using group belts.
- List the standard V-belt designations.
- Describe installation and replacement procedures for V-belts.
- Describe a limited end float coupling.
- List advantages and disadvantages of spacer couplings.
- Explain the purposes of a clutch.
- Describe the operation of a friction clutch.
- Explain the need for overrunning clutches.
- Name at least one application for an electric clutch.
- Explain how a fluid clutch works.

304 Bearings

- Name the two main categories of bearings and cite their advantages.
- Identify bearings by the kind of support they provide.
- Describe the three kinds of stresses acting on shafts.
- Explain natural frequency of vibration and critical speed.
- Name and describe three classes of fits.
- Explain the function of lubricating grooves.

- State two reasons for using seals on plain bearings.
- Name the principal types of plain journal bearings.
- Describe the structure of two kinds of precision inserts.
- Define crush and spread.
- Name and explain the characteristics that are most important in materials for bearings.
- State advantages and disadvantages of the standard types of bearing materials.
- Describe standard practices for inspecting bearings.
- Explain bearing repair procedures.
- Identify the functions of the various parts of a typical rolling-element bearing.
- Explain the three elements of the AFBMA code.
- Define the categories of tolerances for ball bearings.
- Describe the factors that influence running accuracy of bearings.
- Name the factors that must be considered in the design of antifriction bearings.
- Describe the process of checking adequate running clearances for bearings.
- Explain the reasons for using fixed and floating bearings together.
- Describe the common methods of mounting bearings.
- Name the three basic ball bearing designs and describe their characteristics.
- Explain the purposes served by the basic roller bearing shapes and their variations in typical applications
- Identify ten specialized bearings.
- Describe a specific function or application of each of these bearing types.
- Identify the functions of bearing seals.
- Describe the construction and operation of labyrinth and oil seals.
- Explain the two classification systems for oil seals.
- Name typical applications for the different kinds of seals.
- State typical applications for oil lubrication of bearings.
- Detail the cleaning procedures for different oil lubrication systems.
- Discuss the three qualities that are the basis for selecting a grease lubricant.
- Give five easy rules for lubricating bearings.
- Identify a principal cause of early bearing failure.
- Describe installation procedures for antifriction and plain journal bearings.
- Name the different types of bearing failure and their causes.
- Tell how bearings should be cleaned and lubricated after inspection.

305 Pumps

- Describe dead-end and recirculating hot water distribution systems.
- List several special considerations involved in chemical pumping systems.
- Define the term viscosity and give examples of high-viscosity materials.
- Tell the effects of heat on the pumping of high-viscosity materials.
- List some special problems involved in the pumping of solids.
- Describe suction head and suction lift pumping conditions.
- Tell what three elements make up total dynamic head.
- Define static suction head.
- Contrast liquid, brake, and electrical horsepower.
- Tell what useful information can be gained from pump curves.
- Describe the function of the following: pump casing, shaft, impeller, wear rings, and stuffing box.
- Contrast frame-mounted and close-coupled end-suction pumps.
- Give characteristics of fluids pumped with open, semi-open, and closed impellers.
- Name an advantage and a disadvantage each for stainless steel and brass shaft sleeves.
- Explain the construction of a line-shaft turbine pump.
- Name the two types of flow possible in a propeller pump.
- Tell the function of diffuser vanes in an axial-flow propeller pump.
- Define electrochemical corrosion and state its cause.
- Describe fluids that can be pumped by a regenerative turbine pump.
- Describe the fluids that can be pumped by a rotary pump.
- Explain the operation of external- and internal-gear pumps.
- Describe the parts and construction of a lobe pump.
- Compare and contrast timed and untimed screw pumps.
- Tell why sealed bearings might be used in a vane pump.
- Name the parts that make up the power end of a reciprocating pump and describe their operation.
- Define the terms single-acting pump and double-acting pump.
- Compare simplex and duplex pumps.
- Explain how the pumped fluid lubricates a reciprocating pump.
- Calculate the discharge pressure of an air-driven pump when given the piston ratio and motor air supply.
- Tell what kinds of pumps are used for metering applications.

- Describe metering pump lubrication techniques.
- Name the parts of a diaphragm metering pump and the function of each.
- Explain the operation of a diaphragm metering pump.
- Describe the operation of a flexible-tube pump.
- Give an application for a progressing-cavity pump.
- Name one disadvantage of a sealless magnetic-drive pump.
- Explain how to prepare a new centrifugal pump for operation.
- Tell which parts of a reciprocating slurry pump require the most maintenance.
- Tell why slight leakage through shaft seals is necessary.
- Name the type of stuffing box required for pumps operating under suction lift conditions.
- Give a typical application each for cotton, Teflon®, and aluminum packing.
- Describe the procedure involved in replacing pump packing.
- Describe a packingless seal.
- Name three types of antifriction bearings.
- Name three factors to consider when preparing pump lubrication schedules.
- Describe a typical application for both felt and synthetic bearing seals.
- Tell the two major maintenance problems encountered in rotary pumps.

306 Piping Systems

- Identify gate, globe, needle, ball, butterfly, plug, and check valves, and tell what each is used for.
- Explain how and why quick-opening valves are used in industrial piping applications.
- Describe routine inspection, lubrication, and maintenance procedures for common valves.
- Explain how diaphragm valves work.
- Describe the functions of the three main types of blowoff valves.
- Tell how regulating valves, relief valves, and reducing valves are used in industrial piping systems.
- Describe how different kinds of actuators open and close valves in response to pneumatic, hydraulic, or electrical signals.
- Discuss the protective uses of strainers and filters in piping systems.
- Explain how the relationship between pressure and temperature affects steam lines, and creates the need for steam traps.
- Describe proper steam trap maintenance.

- Explain how and why air-vent and water-drain valves are used.
- Describe how a heat exchanger works in a fluid system.
- Describe how different types of gauges are used to measure pressure and temperature in piping systems.
- Explain why rotary pressure joints are necessary in some applications.
- Describe the functions of accumulators and receivers.
- Tell how actuators and intensifiers are used in fluid-power systems.
- Discuss the principles of preventive maintenance and repair maintenance as they apply to piping systems.
- Describe what typical piping systems consist of, and explain their importance to plant operations.
- Identify common valves and fittings, pipe hangers and supports.
- Describe the effects of temperature on piping system components, and explain the need for insulation.
- List routine maintenance considerations for piping systems.
- Explain how metal pipes are sized and designated according to standard codes and schedules.
- Identify the characteristics of metals that make them suitable for a variety of piping applications.
- Describe the different methods of connecting sections of metal pipe, including bell-and-spigot joints, welded, soldered, or brazed joints, screwed or threaded joints, and flanged joints.
- Discuss the major considerations involved in the maintenance of metal piping.
- Name the basic nonmetallic piping materials, and discuss the advantages and disadvantages of each.
- Identify the different forms of clay pipe and concrete pipe.
- Discuss the limitations of plastic pipe.
- Explain the difference between thermoplastic and thermosetting plastic pipe.
- Describe how to join sections of nonmetallic pipe, and how to maintain them.
- Compare piping and tubing, and list the major advantages of tubing.
- Describe the methods of cutting, bending, and joining sections of tubing.
- List the main types of metal tubing, and describe the kinds of industrial applications in which they are used.
- List the main types of plastic tubing, and describe the kinds of industrial applications in which they are used.

- Explain how hoses are sized, classified, and constructed.
- Define basic hose terminology.
- Discuss the respective advantages of metallic hose, nonmetallic hose, and reinforced nonmetallic hose.
- Describe the common types of hose couplings used in industrial service.
- List the primary maintenance requirements of hoses.
- Discuss the main functions of fittings.
- Identify common pipe and tube fittings.
- Contrast screwed, flanged, and welded connections, and tell why one type of joint maybe preferred for a given application.
- Explain how expansion joints and vibration dampeners work.
- Demonstrate a knowledge of the symbols used to represent joints and fittings on schematic drawings of piping systems.
- Explain the various ways in which valves control fluid flow in piping systems.

307 Basic Hydraulics

- Demonstrate how power is calculated.
- Explain the difference between absolute and gauge pressure.
- List the main advantages of tubing.
- Explain the classification of directional-control valves.
- Describe the operation of a check valve, a spool valve, a three-way valve, a fourway valve, and a rotary valve.
- Explain the difference between normally closed and normally open valves.
- Explain the functions of a pressure-control valve, pressure-relief valve, and pressure-reducing valve.
- Describe the operation of a spool valve, poppet valve, and sequence valve.
- Explain the purpose of holding valves, unloading valves, and counterbalance valves.
- Name the operations performed by flow-control valves.
- Describe how pressure compensation and temperature compensation work.
- Describe the purpose of a hydraulic cylinder and explain how a double-acting cylinder works.
- Explain the difference between "pull-type" and "push-type" single-acting cylinders.
- Describe the construction of a hydraulic cylinder.
- Explain the various methods of mounting cylinders.
- Demonstrate how to calculate the flow capacity of a hydraulic cylinder.

- Explain the classification of hydraulic motors.
- Demonstrate how the torque of a hydraulic motor is calculated.
- Calculate the horsepower output of a hydraulic motor.
- Discuss cost factors and other considerations affecting motor selection.
- Describe the construction of a hydraulic motor.
- Explain the operating principles of a gear motor, a vane motor, and a piston motor.
- Describe the two basic types of filter/strainer media.
- Explain the difference between a strainer and a filter, and describe the main function of each.
- Draw graphic symbols for strainers and filters.
- Explain the functions of fluid reservoirs.
- Explain the purpose of reservoir baffles.
- Describe various methods of counteracting high operating temperatures.
- Identify important accessories used with reservoirs.
- Demonstrate pressure ratio calculation for a differential-piston accumulator.
- Name the main classifications of hydraulic pumps.
- List factors affecting pump selection and pump performance.
- Define volumetric efficiency and overall efficiency.
- Identify the most common types of positive-displacement pumps, and describe their operation.
- Discuss the chief considerations in hydraulic line selection.
- Demonstrate how flow velocity and pressure loss are calculated.
- Explain pipe size schedules.
- Describe various types of fittings used in hydraulic systems.
- Explain the reason for using steel pipe.
- Identify various types of hydraulic fluids.
- Name contaminants found in hydraulic systems.
- Describe the difference between laminar and turbulent flow.
- Name the main components of a hydraulic system.
- List the most important properties of hydraulic fluids.
- Explain how viscosity is measured.
- Explain the meaning of the viscosity index.
- Describe the effect of fluid temperature on viscosity.
- Name the causes of corrosion and fluid oxidation.
- Explain Pascal's Law.

- Describe how manually operated valves work.
- Explain the difference between direct-acting and pilot-operated valves.

308 Hydraulic Troubleshooting

- Explain how to determine whether to repair or replace a malfunctioning valve.
- Describe the reasons for hydraulic wire drawing.
- List the reasons for electrical and mechanical failures of solenoid valves.
- Explain how motor and pump shafts are aligned before coupling.
- Explain the correct method for checking direction of pump rotation.
- List several useful hints for solenoid valve installation.
- Explain how pipe sizes are specified.
- Name the common types of pipe joints.
- List six important rules for good piping installation.
- Explain the procedures for reassembling, reinstalling, and testing valves.
- Describe the correct methods for bending and flaring tubing.
- List the key points for correctly installing hydraulic hoses, seals, reservoirs, filters, and actuators.
- List ten important properties of hydraulic fluids.
- Explain the difference between hydrodynamic and boundary lubrication.
- Explain what a fluid's viscosity index means.
- Define demulsibility and emulsibility.
- Describe how to read a viscosity-temperature chart.
- List the proper procedures for installing hydraulic fluid.
- List the major categories of hydraulic system maintenance.
- Name and describe the six essential items in a maintenance file.
- List the steps involved in reconditioning a hydraulic component.
- Explain how to set up a maintenance plan for a typical hydraulic system.
- Describe the troubleshooting process.
- Explain how to evaluate recent maintenance history.
- List typical symptoms of common hydraulic system problems.
- Explain how to determine the cause of and provide a solution to a problem.
- Explain how a portable tester works.
- Describe how to keep and use troubleshooting charts.
- Name five common valve problems and explain the sequence of steps to be followed in trouble-shooting them.

- Describe the proper procedures for valve dis-assembly, cleaning, and inspection.
- Describe the advantages of hydraulic tubing over pipes.
- Name the six basic elements of a hydraulic system.
- Explain the functions of hydraulic pumps, actuators, control valves, conductors and connectors, hydraulic fluid, and fluid storage and conditioning equipment.
- Describe how to trace a system.
- Name three basic types of hydraulic diagrams, and explain the purposes of each.
- Describe how a valve symbol is constructed.
- List the steps to follow when reading a schematic diagram.
- Identify common hydraulic symbols.
- Explain the importance of cleanliness in hydraulic installations.
- Describe possible consequences of neglecting safety precautions.
- Name the most common types of hydraulic cylinders and identify their major parts.
- List the symptoms of internal and external cylinder misalignment.
- Explain what to do if you find internal leakage in a cylinder.
- Name the cylinder components most frequently replaced.
- Explain the purpose of a piston rod boot.
- Describe the symptoms of shock absorber failure.
- List the proper procedures for troubleshooting pumps and motors.
- Name some common causes of pump failure.
- Describe typical causes of cavitation.
- Discuss the major sources of problems in gear pumps and vane pumps.
- Describe the effects of contaminants in axial-piston and radial-piston pumps.
- Explain the differences between a vane motor and a vane pump.

309 Basic Pneumatics

- Explain pneumatic motor classification.
- Define torque.
- Describe pneumatic motor construction.
- Calculate a motor's horsepower, given its torque and speed.
- Differentiate between a pneumatic motor and a rotary actuator.
- Tell the difference between pneumatic and hydraulic cylinders.
- Describe the action of a pivoted cylinder.
- Explain the size relationship between a cylinder port and a valve port.
- Describe the construction and operation of a single-acting cylinder.

- State the purpose of an exhaust flow control metering valve.
- Define relative humidity and dew point.
- Explain the effects of temperature and pressure on the air's ability to hold moisture.
- Describe aftercooler operation.
- Explain the functions of separators, oil scrubbers, and air dryers.
- Describe the two main methods of contaminant separation.
- Explain how filters are classified.
- List contaminant particle sizes and particle contamination categories as they occur in filters.
- List applications for the most common types of filter media.
- Identify system location for lubrication equipment installation.
- State the importance of laminar flow.
- List the factors that affect pressure loss in a pipe.
- State direction and amount of slope for compressor discharge pipes.
- Discuss procedures for pipe, tube, and hose installation.
- Describe safe working procedures for disconnecting air hoses.
- Describe the four methods of identifying control valves.
- List four basic types of manually operated, two-way valves.
- Describe the operation of a two-position, direct-acting, normally closed solenoid valve.
- Explain one major advantage of using a four-way valve.
- Describe the construction of a three-way valve.
- List two ways a valve can control compressor pressure output.
- Describe construction of basic types of pressure-relief valves.
- Contrast a pressure regulator with a pressure-relief valve.
- State the limit imposed by Federal Law on the pressure allowed when an air hose is used to blow off chips.
- Describe techniques for cleaning compressor filters.
- Explain how force is transmitted in a pneumatic system.
- Calculate force and work.
- List two factors that affect the results of pressure calculations.
- Explain pneumatic leverage.
- Briefly explain the physical laws affecting the behavior of a confined gas.
- Differentiate between a positive-displacement compressor and a dynamic compressor.
- Describe the operation of a reciprocating compressor.
- List one advantage of using a multistage compressor.

- Compare the operation of compressor controls in large and small units.
- Identify the cooling arrangements for reciprocating compressors.
- Compare the power output of a single-stage vs a two-stage vane compressor.
- Describe the main types of positive-displacement rotary air compressors.
- Tell how to compensate for a low-speed drive in rotary screw compressors.
- Describe four methods of controlling centrifugal compressor output.
- Explain the advantages and disadvantages of both types of dynamic compressors.

310 Pneumatic Troubleshooting

- Explain the operation of linear actuators (cylinders) in a typical pneumatic circuit.
- Describe the various types of compressors and how they work.
- Define intercooling and aftercooling.
- Describe basic preventive maintenance procedures for compressors.
- List the components of an effective delivered-air system and explain how they work together.
- Describe the three main types of air-line lubrication.
- Explain the different types of symbols used in pneumatic schematic diagrams—how they are constructed and what they show.
- Describe the operation of timing and safety circuits.
- Analyze the schematic diagram of a fluid-power system.
- Describe the proper installation of the compressor and its auxiliaries.
- Describe the installation of aftercoolers, receivers, and dryers.
- Explain the correct procedures for installing pipes, tubes, and hoses in pneumatic systems.
- Describe the installation of control valves, solenoid coils, and cylinders.
- Explain the concept of planned maintenance.
- Describe the basic procedures for maintaining the compressor and other important components in a pneumatic system.
- Describe the maintenance of industrial control circuit components.
- Explain the proper maintenance of pneumatic tools.
- Discuss the various types of maintenance logs and explain what kind of information is recorded in each.
- List, in proper sequence, the steps to be taken in troubleshooting a pneumatic system.
- Name and describe the five important parts of every pneumatic system's operations manual.

- Describe procedures for troubleshooting an actuator.
- Explain how to check control valves, sequence valves, and interlocks.
- Describe methods of cooling and lubricating reciprocating compressors.
- Explain the proper maintenance of compressor valves.
- Identify problems associated with the control system of a compressor.
- Describe the basic maintenance requirements of rotary, vane, rotary-screw, and centrifugal compressors.
- Outline how to isolate a control malfunction in a pneumatic circuit.
- Explain how to troubleshoot a nonstarting or nonoperating circuit, improper sequencing of the circuit, and miscellaneous problems related to the equipment.
- Describe the proper procedures for checking electric solenoids.
- Explain how to check for problems related to valve shifting, control timing, and lubrication.
- Define the different types of pneumatic cylinders.
- Describe the construction of a typical cylinder.
- Describe the proper procedures for troubleshooting cylinders, including checking for misalignment, worn packings, and adequate air pressure.
- Explain general installation techniques for cylinders and accessories.
- Explain how to check for sufficient clean air when troubleshooting an inoperative air motor.
- Explain how to keep hoses, clamps, and couplings in good condition.
- Describe the operation and maintenance of vane, radial piston, and axial-piston air motors.
- Explain why and how compressed air and hydraulic pressure are combined.
- Describe the role of boosters in pneumatic/hydraulic systems.
- Explain how single-pressure and dual-pressure booster systems work.
- Describe the advantages and disadvantages of combined air-oil cylinders.
- Explain how pneumatic and hydraulic actions can be interlocked.
- Discuss the proper troubleshooting procedures for air-oil systems.

TPC Pneumatics

1003 Introductory - Pneumatics

- Understand the basic physics of energy, work, and power, as it applies to pneumatics.
- Understand the gas laws, flow and pressure application, and the basic components that make up a pneumatic system

- Understand the basic physics, as it relates to compressed air, including how it is compressed, stored and cooled
- Understand the different types of compressors and related devices used in air compression and their graphic symbols
- Understand air preparation and conditioning components, illustrating their functionality and application
- Recognize air preparation and conditioning components corresponding graphical symbols
- Understand the various types of air line conductors, including steel pipe, copper tubing, and plastic tubing
- Understand air line conductors different applications and how they link together to form an air line distribution network
- Identify the various types of pneumatic actuators, how they function, and their associated schematic symbols
- Understand basic pneumatic formulas associated with calculating force and torque, as related to pneumatic actuators
- Identify the various types of pneumatic control valves and their associated graphic symbols. You will also learn how the valves function and their associated applications.
- Understand the basic physics of vacuum and how it is applied in a pneumatic vacuum control system
- Understand vacuum control components, such as vacuum generators, vacuum pumps and gripper cups and learn the graphic symbol representation of each component

TPC Power Plant

111 How Power Plants Work

- List the kinds of pumps used in a boiler system and explain the function of each.
- Calculate absolute temperature values using Fahrenheit and Celsius readings.
- Explain how boiler efficiency is related to steam temperature and pressure.
- Describe how condensate is formed in a boiler system and how it can be used to create a closed cycle system.
- List the two main uses for water in a power plant.
- Describe the physical and chemical properties of water.
- Explain the past and present methods used to purify water for use in a power plant.
- Explain the common handling procedures for flue gases and solid wastes, and describe the problems involved in disposing of these wastes.

- List some of the ways in which power plant waste problems might be resolved in the future.
- Give a detailed description of the arrangement of a modern steam generating plant and explain the progression of the steam cycle from one end to the other.
- Compare and contrast the common instruments for measuring temperature.
- Compare and contrast the common instruments for measuring pressure.
- List some of the special measurement devices that are important in a steam generating plant.
- List the alternate power sources described in the lesson.
- Explain the concept of nuclear power and describe the operation of a nuclear power plant.
- List the methods commonly used to create efficiency in a boiler.
- Describe the components of an elementary turbine.
- List the uses of exhaust steam.
- Explain how a vacuum is produced in a boiler system.
- Describe the basic concepts involved in converting energy to electricity through a steam power plant.
- Explain why air is important in combustion and describe how air is heated.
- Describe the basic design of a boiler.
- Explain the purpose of a superheater.
- Explain the process by which air is heated in a boiler system.
- Describe the common processes by which boiler feedwater can be heated, and explain how such processes increase boiler efficiency.

112 Generating Steam in the Power Plant

- List the problems associated with wastewater disposal and describe how these problems are overcome.
- Describe the factors that affect boiler efficiency, as well as auxiliary equipment efficiency.
- Calculate thermodynamic efficiency.
- List practices that aid in energy conservation in all areas of the power plant.
- Explain how the two types of sootblowers remove soot and slag from heat exchange surfaces.
- Describe how scale forms on boiler surfaces and list the three common removal methods.

- Explain why both hot-end and cold-end corrosion occur in a boiler, and tell what practices help prevent corrosion.
- Describe how refractory should be maintained and list the problems that can occur if it is not properly maintained.
- List the primary functions of boiler control systems and describe the three common types.
- Explain how to calibrate and clean boiler control systems and maintain compressed air systems.
- Summarize maintenance procedures for boiler auxiliaries such as pumps, valves, motors, and electric circuits.
- Identify the different ranks of coal and describe how the makeup of coal affects its heating value.
- List the properties that are tested in a coal analysis.
- Summarize the properties of oil and natural gas fuels.
- Explain the combustion process in detail.
- Define energy and describe the main forms of energy encountered in a power plant.
- Explain the process of combustion and list the three elements necessary for combustion to occur.
- Explain the principles of temperature and pressure measurement and describe the four scales on which temperature is measured.
- Describe the methods of heat transfer and the effects heat transfer can have on a material.
- Summarize the interrelationship of temperature, volume, and pressure in a gas.
- Compare the two basic types of boilers.
- Describe the characteristics by which boilers are classified.
- Explain the different processes by which water is treated for use in a boiler.
- Define blowdown and explain its importance in boiler operation.
- Describe how to interpret and adjust a flame's characteristics in coal, oil, and gas burners.
- Describe the three types of coal firing systems.
- List the ways in which combustion efficiency is measured.
- Trace the flow of water and steam through the boiler system.
- Explain the relationship between temperature and pressure and explain why superheated steam has a higher quality than saturated steam.

- Compare natural circulation boilers with forced circulation boilers, and explain how pressure and temperature affect the type of boiler used.
- Read a steam table properly and apply its information to a boiler system.
- Describe the process of operating a high-pressure boiler at low pressure.
- Describe how proper maintenance of steam traps, valves, packing, flanges, and insulation improve the energy conservation rate in a boiler system.

113 Using Steam in the Power Plant

- List the four kinds of charges normally found on a power bill.
- Define peak demand.
- Calculate a plant's load factor.
- Describe the steps involved in performing demand analysis.
- Calculate demand cost and explain the effect of short demand peaks on billing.
- Define power factor and explain how it is calculated, what causes it to be low, and how it can be improved.
- List the types of power losses that occur in transformers and describe the cause of each.
- Explain how to maintain protective devices, cable systems, and generators and motors.
- Explain the importance of energy conservation in power plants.
- Define relative humidity and explain how it is measured
- Define the terms refrigeration ton and refrigeration effect
- Name and describe the three common kinds of compressors used in air-conditioning systems
- Name and describe the three kinds of condensers used in air-conditioning systems
- List the metering devices used in an air-conditioning system and explain their uses
- List the accessories and controls that are found in an air-conditioning system and state their purposes
- Describe the air-handling system and its components
- Explain how to measure velocity pressure and static pressure
- Explain several maintenance practices that will improve the efficiency of an air-conditioning system.
- Name the five main parts of a steam turbine system and explain the function of each.
- Contrast the operating principle of an impulse turbine and a reaction turbine.
- Define the terms tandem compound and cross compound.
- Explain how a condenser improves turbine efficiency.

- Explain how an overspeed trip is activated.
- List three causes of turbine rotor vibration.
- Name the main cause of bearing failure in a turbine.
- Define the term variable.
- Describe the three main classes of boiler instruments.
- List the four variables on which boiler instrumentation usually provides data.
- Name the four common types of pressure gauges, and describe the characteristics and uses of each.
- Name and describe the three types of flowmeters commonly used in power plants.
- Name and describe the four types of temperature gauges commonly used in power plants.
- Describe the uses for gauge glass assemblies in power plant instrumentation.
- Explain the purpose of combustion control systems and describe the three basic kinds.
- Describe the three kinds of feedwater regulators.
- Explain the importance of safety valves and flame safety devices in power plants.
- Explain the basic principles of electricity and electric power, including the significance of Ohm's Law
- Identify the parts of an electrical circuit and describe the function of each part
- Contrast series and parallel circuits
- Explain the difference between the two main groups of generators and further describe each group in terms of its sources of mechanical power
- Define phase difference and power factor, and describe a three-phase system
- Explain the function of a transformer
- Describe the variety of metering instruments used to measure the value of electric energy
- Explain the purpose of an electric distribution system, and list the three main kinds
- Name four kinds of protective equipment used in power systems
- Explain the purpose of a line diagram.

114 Waste-to-Energy Fundamentals

- Explain how odors are managed in an MSW facility.
- Describe the three upset conditions in an MWC that can be dangerous to personnel and property.
- List the causes and symptoms of common MWC process problems.
- List the three sources of profit in a typical MWC.

- Define the terms theoretical air and excess air and tell why they are important.
- Explain the use of common air pollution control equipment and processes.
- Tell how soot and slag are formed and how they are removed.
- Describe the characteristics of MSW ash.
- Explain the safety considerations when handling MSW ash.
- List the major ash handling equipment.
- Describe the ash treatment and testing program.
- List the materials recovered from ash.
- List some potential uses for ash.
- State the main responsibilities of an MWC operator.
- Define the terms turnover, parameter, and walkdown as they relate to MWC operations.
- Explain the importance of operator training.
- List typical receiving and feeding equipment and explain its functions.
- Describe how conveyors are used in a typical RDF facility.
- Explain the impact of corrosion on MWC design.
- Describe mass-burn and RDF feed systems.
- Explain the operation of the following types of stokers: reciprocating grate, reversed reciprocating grate, oscillating grate, roller grate, and traveling grate.
- Define and contrast overfire air and underfire air and explain why the control of combustion air is important.
- Explain the advantages and disadvantages of a rotary combustor.
- Explain the combustion process as it occurs in a municipal waste combustor.
- Name the two main factors that determine feed rate.
- Explain the permitting program.
- State the definition of MSW and list some kinds of waste excluded from MSW.
- Explain the various methods of classifying MSW.
- Discuss safety concerns related to the handling of MSW.
- Explain the differences between mass-burn MSW and RDF.
- Compare and contrast MSW and fossil fuels.
- Describe the MSW flow in a mass-burn and an RDF facility.
- Explain the responsibilities of the weight scale operator.
- Describe the tipping floor and refuse pit.
- Summarize the history of waste handling.
- List some problems associated with landfills and the benefits of waste-to-energy conversion.

- Name the federal regulations that apply to MWCs.
- Explain how NSPS regulations affect the operation of MWCs.

TPC Process Control Instrumentation

271 Introduction to Process Measurement and Control

- Define setpoint, control point, and error.
- Explain how measurement and control are related in industrial processes.
- Describe the four essential functions of an automatic control system.
- Discuss the functions of PLCs and industrial computers in control systems.
- Identify variables in industrial processes.
- Explain the importance of feedback in a closed-loop control system.
- Discuss the differences between modern automatic control systems and older systems.
- Identify the standard signals used in process control.
- Define the terms commonly used in control terminology.
- Describe on/off, proportional, integral, derivative, and PID controller action.
- Discuss standard signals and linearity and explain how to calculate the value of a variable from an instrument's span and range.
- Describe five common sources of error in signal measurement.
- Discuss the basic principles governing pneumatic signal transmission and explain how a flapper-nozzle device works.
- Describe the function of the controller in a control loop.
- Discuss the basic principles governing electrical signal transmission, including Ohm's law, and list standard current and voltage signals.
- Explain the function of I/P devices in a typical control system and discuss the use of digital signals and optical signals.
- Explain why measurement is necessary and discuss conditions that affect the degree of accuracy required.
- Compare the advantages of linear and nonlinear displays.
- Compare analog and digital devices and explain how each is applied to measurement.
- Name five sources of measurement error.
- Discuss proportionality and explain how it applies to transmitters.
- Discuss the need for linearity in a process.
- List examples of mechanical and electrical transducer elements.
- Compare pneumatic response and electrical/electronic response in transducers.

- Describe the operation of the bourdon tube, bellows, and diaphragm.
- Give examples of resistance, voltage-response, and frequency-response devices and explain how they work.
- Discuss the use of the Hall-effect transducer and the differential transducer.
- Discuss the basic elements of measuring systems and explain how they interact.
- Describe how a physical quantity is translated into another quantity.
- Discuss the use of transmitters to relay information from one location to another and explain the transfer function.

273 Pressure Measurement

- Compare the three forms of matter.
- Define pressure and explain the difference between gauge pressure and absolute pressure.
- List the conditions that affect the pressure of a liquid.
- Explain how changes in volume affect the pressure of a gas at a constant temperature.
- Explain how changes in temperature affect the volume of a gas at constant pressure, and the pressure of a gas with a constant volume.
- Identify the two causes of pressure drop in a pipe carrying liquid from a tank.
- Explain how a manometer works.
- Describe four kinds of bourdon-tube sensors.
- Discuss construction details of bourdon tubes, diaphragms, and bellows.
- Explain how bellows pressure sensors work.
- Describe how calibration may be accomplished and list the steps in calibrating a pressure gauge.
- Explain how normally open and normally closed pressure switches work.
- Discuss the advantages and disadvantages of the potentiometric pressure transducer.
- Explain how a P/I transducer works.
- Describe the operation of capacitive, inductive, and servo pressure transducers.
- Compare the three kinds of strain gauge pressure transducers.
- Describe the operation and advantages of the piezoelectric pressure transducer.
- Discuss three environmental conditions that can affect transducer operation.
- Define the pressure unit torr.
- Calculate pressure in specified units when given the pressure in other units.
- Explain the operation of a differential-pressure transmitter and a slack-diaphragm gauge.

- Name two kinds of ionization gauges and describe how they work.
- Describe the capacitance manometer.
- Compare the operation of the Pirani gauge and the thermocouple gauge.
- List the components of a pressure-transmitter installation.
- Compare methods of joining pipes and other instrumentation components.
- Describe the procedure for placing a pressure instrument into service.
- Discuss the elements of periodic maintenance.
- Explain how to calibrate pressure instruments with electric and pneumatic outputs.
- Describe three important techniques used in troubleshooting and repair.
- List five important safety rules.

274 Force, Weight, and Motion Measurement

- Define force, stress, strain, and deformation in terms of the English and SI units used for their measurement.
- Describe the relationship between stress and strain (Hooke's law).
- Describe the operation and construction of various kinds of strain gauges.
- Identify the electrical circuits used with strain gauges.
- Describe the piezoelectric effect and the capacitance mat and discuss typical applications.
- Define and compare weight and mass, including SI and English units.
- Explain the relationship between a mass and the acceleration of that mass.
- Discuss Newton's first law of motion.
- Describe spring scales, equal-arm balances, and unequal-arm balances.
- Discuss the operating principles governing load cells.
- Describe the operation and application of industrial batch scales.
- Name the parts of a belt scale and explain how a typical belt scale operates.
- Discuss the use of roller scales.
- Describe the scale comparison, calibration chain, and electronic integrator methods of calibrating in-transit scales.
- Explain how radiation detectors work and describe the operation of a nuclear scale.
- Describe how continuous weigh feeders operate and discuss typical applications.
- Describe how micrometers and dial indicators are used to gauge an object and to make a position measurement.
- Explain how precision potentiometers, tracer systems, variable-reluctance transducers, and proximity detectors measure linear position.

- Describe how air gauging is used to measure inside and outside diameters.
- Discuss the operation and uses of LVDT gauge heads.
- Explain how typical rotary potentiometers, synchros, and encoders operate.
- Discuss applications for extensometers and full-field devices.
- Compare speed and velocity and calculate speed from distance and time.
- Explain how the accelerometer works.
- Contrast direct and indirect speed measurement and give examples of each.
- Discuss the operation of LVDT, potentiometric, and piezoelectric accelerometers.
- Describe the undesirable effects of vibration and discuss ways of preventing them.

275 Flow Measurement

- Explain the difference between density and relative density (specific gravity).
- Define the terms fluid velocity, viscosity, and volume flow rate.
- Describe laminar flow and turbulent flow.
- Explain how static head, friction head, and velocity head differ from each other.
- Explain how pipe size, pipe friction, and fluid viscosity affect the measurement of fluid flow.
- Describe direct and indirect flow measurement methods.
- Describe how a primary device creates a differential pressure.
- Give at least three examples of common primary devices and explain how each works.
- Describe the significant features of orifice plates and explain their functions.
- Discuss the conditions that determine the length of straight pipe required for each kind of primary flowmeter.
- Explain why both accuracy and precision are required in a secondary measuring device.
- Explain how to calibrate dry and wet manometers.
- Give examples of secondary measuring devices and explain how they work.
- Explain how to calibrate a differential pressure transmitter and discuss the different outputs available.
- Discuss the similarities and differences between rotameters and orifice instruments.
- Compare the benefits of linear and nonlinear scales and explain how a square-root extractor is used.
- Explain how calibration, relative density, viscosity, and temperature affect rotameter readings.
- Describe how changes in the pressure, temperature, and relative density of a gas affect the ability of a rotameter to measure its flow rate.

- Discuss the operation of piston- and vane-type flowmeters and explain why armored rotameters and orifice-plug flowmeters are used.
- Describe the structure and function of a weir.
- Identify various weir components—notch, crest, pond, bulkhead, and head gauge.
- Describe the construction and function of a Parshall flume.
- Identify the parts of a Parshall flume—crest, throat, stilling well, and diverging and converging sections.
- Explain how ultrasonic and capacitance-level measuring devices are used to detect open-channel flow rates.
- List the advantages and disadvantages of positive-displacement meters.
- Describe the operation of the reciprocating-piston meter and the oscillating-piston meter.
- Describe the operating principles of the sliding-vane rotary meter and the nutating-disk meter.
- Identify the elements in lobed-impeller, oval, and helical flowmeters.
- Explain the operation of a dry-gas bellows meter.
- Discuss the calibration of positive-displacement meters.
- Describe the operating principles governing turbine flowmeters.
- Discuss the construction of turbine flowmeters.
- Describe how an inclined manometer differs from a conventional U-tube manometer.
- Discuss the advantages and disadvantages of turbine flowmeters.
- Describe the operating principle governing magnetic flowmeters.
- Describe significant advantages and disadvantages of magnetic flowmeters.
- Discuss in detail the operation of a vortex-precession meter.
- Define the term vortex shedding and describe vortex-shedding meters and their output system.
- Explain mass flow and describe a Coriolis meter.
- Discuss the principles of thorough and safe instrument maintenance.
- Discuss the basic rules of safety in instrument servicing.
- Discuss the continuous measurement and control of the flow of solid material in a process.
- List the steps in instrument calibration.
- List guidelines for correct system installation.
- Describe components of a differential pressure flow-measurement system.
- Describe how a slurry is made, transported, and metered.

- Define the term meter factor and explain how it is obtained.
- Explain the operation of a mass flowmeter.
- Discuss the operation of the belt-type solids meter.
- Name and describe three kinds of thermal flowmeters.
- Describe the Doppler-shift, beam-deflection, and frequency-difference methods used by ultrasonic flowmeters.

276 Level Measurement

- Define datum point, and contrast direct and indirect level measurement.
- Describe the main kinds of surface-sensing gauges.
- Define buoyant force and explain how it is used in displacer gauges to measure liquid level.
- Describe maintenance procedures for float devices, displacer gauges, and sight glasses.
- Compare the use of sight glasses, mercury level switches, and magnetic reed switches.
- Differentiate between continuous and point level measurements, and between direct and indirect level measurement.
- Describe the operation of a conductance probe in a conducting liquid.
- Describe the operation of a capacitance probe in a dielectric liquid.
- Explain the operation of ultrasonic, resistance, and photoelectric level sensors.
- List the data needed to compute the level of a bulk solid in a bin.
- Describe and compare the operation of wire strain gauges and semiconductor strain gauges.
- Compare the advantages and disadvantages of ultrasonic and microwave level-measuring methods.
- Discuss the operation of capacitance probes, resistance probes, and bob-and-cable units in measuring bulk solids.
- Describe how diaphragm switches and tilt switches are used for point level detection in automatic bin fillers.
- Discuss the use of rotating-paddle detectors in controlling level within a band.
- Explain how radiation level detectors are used for both continuous and point level measurement.
- Describe the operation of ionization radiation sensors, semiconductor radiation sensors, and scintillation counters.
- Discuss the operation of an infrared point level detector.

- Describe several methods of measuring interface levels.
- Explain how range suppression and range elevation are used.
- Discuss the important considerations in equipment selection.
- Explain how a force-balance diaphragm system works.
- Discuss the relationship between pressure head and the location of the pressure (level) indicator.
- Define hydrostatic pressure and explain how it is calculated by means of the relative density (specific gravity) of a liquid in a tank.
- Describe conductance point level probes, capacitance point level probes, and ultrasonic point level detectors.
- Describe the operation of a differential-pressure transmitter and explain how it is used to measure level and density.
- Compare air bellows and air purge systems and discuss the advantages for each.

277 Temperature Measurement

- List three kinds of immersion thermometers and explain how each should be used.
- Explain how to use controlled-temperature baths and dry-block calibrators.
- Explain how to calibrate and/or verify liquid-in-glass thermometers, thermocouples, resistance thermometers, and pyrometers.
- Describe typical inspection procedures for temperature-measuring instruments.
- Define thermal energy and explain the relationships among thermal energy, heat, and temperature in a substance.
- Correlate changes in temperature with changes in a substance's physical state.
- Compare four temperature scales and convert temperature readings from one scale to another.
- Explain how primary and secondary temperature calibration standards are used.
- Describe various temperature-measuring devices and contrast thermometers and pyrometers.
- Discuss the physical characteristics and operation of bimetallic thermometers.
- Describe how liquid-in-glass thermometers are constructed and how they operate.
- Compare liquid-, gas-, and vapor-filled systems and discuss their advantages and disadvantages.
- Explain the operation of a Bourdon tube.
- Define the function of a transducer in a filled system.
- Discuss the relationship between temperature and electrical resistance.

- Describe the function of RTD bridge circuits and explain how to calculate lead-wire errors.
- Compare the accuracy, response time, stability, and circuit complexity of RTDs and thermistors.
- Describe the operation of a thermocouple and explain how to compensate for changes in the reference junction temperature.
- Discuss the principles that govern noncontact thermal measurements.
- Define electromagnetic radiation and emittance.
- Discuss the characteristics of a blackbody.
- Describe the effects of temperature and emittance on radiation intensity.
- Describe the operation of optical and radiation pyrometers.
- Compare and define primary, secondary, and working calibration standards.
- Define the term calibration and explain why it is important.

278 Analytical Instrumentation

- Define conductivity and discuss the basic principles governing conductivity.
- Compare the operation of contacting probes and inductive probes.
- Describe four kinds of liquid chromatographs.
- Explain how to read a chromatogram.
- Discuss chromatograph calibration techniques and identify variables that can affect chromatograph accuracy.
- Discuss chromatograph maintenance considerations.
- Describe two procedures for calibrating conductivity probes.
- Discuss proper installation and maintenance practices for conductivity probes.
- Discuss the operation of stack gas analyzers.
- Describe pH and ORP measurement processes.
- Describe the instruments used for the measurement of pH and ORP.
- Discuss calibration procedures for pH and ORP measurement instruments.
- Discuss general installation and maintenance procedures for pH and ORP measurement instruments.
- Describe the components that make up an optical analyzer.
- Discuss the basic operating procedures of silica ion and COD optical analyzers, turbidimeters and nephelometers, refractometers, and nondispersive infrared analyzers.

- Compare procedures for calibrating an optical analyzer with standards, with grab samples, and electronically.
- Discuss installation considerations and basic maintenance procedures for an optical analyzer.
- Identify the main components in the combustion process.
- Describe the various kinds of instruments used for measuring the products of combustion.
- Discuss the principles of operation of instruments that measure the products of combustion.
- Describe the basic maintenance procedures for instruments that measure the products of combustion.
- Discuss the various sampling techniques for measuring the products of combustion.
- Discuss the principles of chromatograph operation.
- Describe four kinds of detectors used with chromatographs.

279 Final Control Elements

- Discuss the advantages of universal motors and stepper motors.
- Name at least three kinds of relays in use today and give typical applications for them.
- Discuss the applications and advantages of programmable logic controllers.
- Name the basic components of dc and ac electric motors and explain how they work.
- Describe the operation of a solenoid with a valve.
- Describe the basic principles of operation for both pneumatic and hydraulic actuators.
- Discuss the relationships among pressure, temperature, and volume in a pneumatic system.
- Compare the operation of direct- and reverse-acting actuators.
- Describe the major components of a simple hydraulic system.
- Discuss the desirable characteristics of hydraulic fluid.
- Describe elements of hydraulic system maintenance.
- Describe the components of a control valve.
- Compare the operation and advantages of globe, cage, butterfly, ball, sliding-gate, diaphragm, and split-body valves.
- Discuss the operation, advantages, and disadvantages of proportional/servo valves.
- Explain the differences among linear, quick-opening, and equal-percentage flow characteristics.
- Discuss mechanical requirements for valves and valve actuators.

- Define the terms flashing and cavitation and tell how to avoid them.
- List important considerations in proper control valve selection.
- Describe the sequential valve control used in a typical feedwater control system.
- Discuss the use of limit switches for automatic valve control.
- Describe a typical relay logic system.
- Describe the operation of a hydraulic fluid supply system for a turbine generator.
- Explain the operation of an industrial robot system.
- Discuss the function of final control elements in process loops.
- Explain how an actuator is used with the final control element.
- Discuss the effect of a disturbance on the performance of a process loop.
- Describe the three parts of a final control element subsystem.
- Discuss the differences between electric and fluidic control signals in the operation of final control elements.
- Explain how an electromechanical relay works.

280 Safety, Calibration, and Testing

- Discuss kinds of hazards and compare employer and employee responsibilities relating to safe job practices.
- Describe safe procedures for working with compressed gases, acids, flammable solvents, and other hazardous chemicals.
- Discuss the importance of proper decontamination procedures.
- Describe ways to minimize the possibilities of hazardous or lethal electric shock, including safe lockout procedures.
- Explain the use of dosimeters.
- Identify potential safety hazards in the instrument shop and along the process control network and describe the use of appropriate safety equipment for each hazard.
- Explain the differences between repairing, maintaining, and calibrating instruments.
- Name factors to consider when scheduling maintenance.
- Explain the importance of keeping careful maintenance and repair records.
- Discuss the forms used to keep track of equipment inventory, repairs, and procedures for testing and calibration.
- List the contents of an equipment history file and a process loop file.
- Discuss the benefits of failure mode analysis.
- Define the term calibration, and explain the meaning of primary, secondary, and working standards.

- Describe the typical main sections of an industrial instrument shop.
- Describe the differences between electrical and electronic test areas.
- Describe how the ammeter, megohmmeter, wattmeter, and dynamometer are used in electrical work.
- Describe how the multimeter, signal/waveform generator, oscilloscope, voltage and current source, and frequency counter are used in electronics.
- Discuss the benefits of accurate calibration and thorough equipment maintenance records.
- Explain how test stands and emulators are used.
- Describe the layout and power requirements of a typical pneumatic/hydraulic station.
- Describe safe and efficient methods of cleaning pneumatic and hydraulic instruments and controls.
- Name three kinds of operations that are typically conducted on site.
- Discuss procedures for testing and evaluating a faulty component, using the calibration of a pressure-to-current (P/I) transmitter as an example.
- Describe proper procedures for disassembling and reassembling pneumatic and hydraulic components.
- Describe the testing and calibration equipment used in a typical pneumatic/hydraulic area.
- Name the steps in preparing to service instruments on site.
- Explain how an understanding of the process and its instrumentation reduces troubleshooting time.
- List at least four kinds of information typically included in a manufacturer's manual or instruction book.
- Describe the contents of an instrument history file and explain its usefulness in troubleshooting.
- Discuss the kinds of tools you are likely to use in troubleshooting.
- Describe the steps in a typical troubleshooting procedure and explain how to use a branching troubleshooting chart.
- Define the term cascading failure.
- Discuss the specifications of a typical measurement system.
- Explain how to read a graph showing a linear or nonlinear transfer function, hysteresis, or the time constant.
- Discuss SI and English systems of units and explain how to convert from one to the other.

- Describe the elements of instrument calibration.
- Discuss the standards commonly used in instrument calibration.

TPC Process Control Systems

281 Working with Controllers

- Describe the kinds of controllers most often used in industrial applications.
- Name and discuss six important problems of process dynamics that controllers must overcome.
- Compare the actions of current proportioning, position proportioning, and time proportioning.
- Name four kinds of controller alarms.
- Discuss the importance of safety in control loops.
- Explain why automatic/manual control is necessary.
- Explain how on/off controllers work and discuss the difference between on/off and proportional controllers.
- Describe a basic controller tuning process.
- Describe current-, time-, and position-proportioning controllers and name possible uses for each.
- Explain how split control works.
- Describe the effect of the proportional, integral, and derivative modes on a controller's response to process changes.
- Discuss proper uses for the proportional, integral, and derivative modes.
- Explain how the proportional, integral, and derivative modes affect the tuning of a controller.
- Describe the procedure for tuning a controller by the step-change response method.
- Compare cascade, feedforward, ratio, and auctioneering control strategies.
- Describe three optional features used with auto/manual controllers.
- Discuss the use of remote setpoint, auxiliary outputs, and several kinds of indicators as hardware options for controllers.
- Explain how input signal conditioning, anti-reset windup, adaptive gain, error-squared calculation, and setpoint/output ramp and clamp affect controller operation.
- Discuss the use of limit and alarm options available for controllers.
- Describe five ways of suppressing electrical noise.
- Discuss the effects of an inadequate power supply and explain how to regulate it.
- Describe ways to avoid the harmful effects of electrical coupling.

- Explain how temperature variations affect controllers.
- Describe the kinds of equipment and proper connections needed to test controllers.
- Discuss elements of effective controller maintenance and troubleshooting.

282 How Control Loops Operate

- Explain the difference between an open loop and a closed loop.
- Define error, feedback, disturbance, and feedforward control.
- List several kinds of process sensors and describe the operation of each.
- Explain how accuracy, resolution, sensitivity, linearity, and step response affect sensor operation.
- Describe the functions of process controllers, recorders, signal conditioners, and final control elements.
- Explain the basic operation of a typical control loop.
- Describe the difference between continuous and discontinuous control modes and give an example of each.
- Describe the action of the various continuous control modes.
- Define proportional band, reset time, and rate time.
- Discuss the advantages of each of the combination control modes.
- Name several advantages of digital controllers.
- Discuss the differences between supervisory control, direct digital control, and distributed control systems.
- Describe how a cascade control system works.
- Identify the primary and secondary variables in a cascade loop.
- Compare feedforward and feedback control.
- Identify dependent and independent variables in ratio control.
- Explain the advantage of having a secondary control loop in ratio control.
- Describe how a multivariable control system works and define interaction.
- Describe two kinds of process time lags and give an example of each.
- Discuss the effects of capacitance and resistance on loop dynamics.
- State the three main objectives of a well-designed process control system.
- Describe how PI, PD, and PID controllers are adjusted to achieve optimum response.
- Discuss the effects of system gain and phase shift on system stability.
- Discuss the classification of hazardous locations as identified in the NEC.
- Define volatility and flash point.
- Explain the purpose of a purged enclosure.

- Describe two kinds of explosionproof enclosures.
- Discuss ways of making a system intrinsically safe.
- Describe examples of fail-safe mechanisms, and differentiate between hard and soft constraints.
- Compare latching and nonlatching alarm systems, and explain the function of annunciators.
- Discuss the purpose and operation of interlocked and sequential control.
- Recognize standard symbols used in process control diagrams.
- Describe a process control system through the use of instrument symbols.
- Recognize and use four kinds of process control diagrams.
- Analyze a process control drawing for the elements, signal flow, and process flow.
- Convert sequence-of-operation text to a flowchart.
- Recognize elements of electrical and electronic control diagrams and drawings.
- Recognize symbols used on electrical and electronic diagrams, including those for PLCs and SAMA logic.
- Compare and contrast electrical diagrams and PLC ladder diagrams.
- Discuss the role of computers in process control.

283 Data Transmission

- Compare analog and digital data representation.
- Discuss uses for bar graph displays, monitors, recorders, and data loggers.
- Describe the characteristics of the electrical output signals from analog sensors and transducers, using a strain gauge as an example.
- Discuss the significance of the common-mode rejection ratio in signal conditioning.
- Describe the differences between data transmission in open- and closed-loop systems and with local and remote indicators.
- Discuss the differences among analog, digital, and discrete control.
- Discuss the use of intrinsically safe and explosion-proof equipment.
- List the advantages and disadvantages of mechanical, hydraulic, and pneumatic data transmission.
- Compare voltage-loop and current-loop transmission for analog data and explain the importance of resolution for digital data transmission.
- List the advantages and disadvantages of optical, telemetric, and wireless data transmission.

- Describe the processes of signal conversion, compensation, zero and span adjustment, linearization, and conversion to engineering units.
- Discuss the differences between analog and digital data forms.
- Discuss several reasons for using digital data.
- Describe methods used to interface process control data signals to a communications network.
- Explain how analog data are converted to digital form for transmission and display.
- Discuss the differences between parallel and serial data transmission systems.
- Name the basic elements in an optical data transmission system.
- Explain how optoisolators work and why they are used.
- Describe the advantages and disadvantages of optical data transmission.
- Explain how light rays are propagated down optical fibers.
- Discuss connection and installation methods for fiber optic cables.
- Discuss the selection of light sources and detectors.
- Define electrical noise, process noise, and the signal-to-noise ratio.
- Explain how ac power lines, EMI, capacitive coupling, and ground loops cause electrical noise.
- Describe two kinds of noise filters and explain three methods of reducing ac power line noise.
- Compare methods for reducing electromagnetic and electrostatic coupling.
- Discuss the use of differential measurements and the CMRR.
- Describe the ways of reducing ground loop noise and RFI and explain when optical coupling might be used.

284 Computers in Process Control

- Discuss the history of the application of computers to continuous and batch process control.
- Describe the function of an RTU in a SCADA system.
- Describe the development of distributed control systems from microprocessor-based instruments, including programmable logic controllers.
- Define the terms hardware, firmware, and software as they relate to personal computers.
- Explain the concept of an integrated control system.
- Describe the various kinds of small computers used in process control.
- Explain how a "smart" device differs from its conventional counterpart.

- Discuss the similarities between microprocessor-based instruments and conventional instruments and list several advantages of microprocessor-based instruments.
- Describe the roles of PLCs, PACs, and PCs in process control.
- Compare bus, star, hub, and ring network topologies and token-passing, contention, and polling protocols.
- Explain why today's DCS users must be more computer literate than previously.
- Discuss ways of calculating and ensuring DCS reliability.
- Describe the functions of six typical DCS peripherals.
- List advantages and disadvantages of all-digital process control systems, such as fieldbus.
- Describe the basics of a simple configuration process.
- Discuss the preparatory steps required for configuration.
- Describe a typical hierarchical display arrangement and discuss the progression of the configuration process from level to level.
- Discuss the automatic configuration of auxiliary displays.
- Discuss the DCS functions for which the operator is and is not responsible.
- Discuss the development of integration in industry.
- Describe how continuous and discrete processes fit into the concept of total business integration.
- Describe the purposes of MAP and OSI.
- Discuss the functions of CAD, CADD, CAE, CAM, and cell control in discrete processes.
- Discuss the importance of FMS, MRP, JIT, and MMS in today's integrated industrial plant.
- Explain how SPC ensures quality control in open-loop processes.
- Discuss the advantages of integrating batch, continuous, and discrete processes throughout a plant.
- Describe the elements of a typical workstation.
- Discuss the functions of remote processing units and host/guest computers in DCSs.

TPC Waste Water Treatment

381 Introduction to Water Technology

- Explain the ionization of water.
- Define alkalinity.
- Define acidity.
- Explain how an aerated grit chamber works and how to tell if it is not working correctly.

- List several maintenance checks to make on chain and flight grit collectors.
- Define viruses.
- Define algae and protozoa.
- Define higher organisms.
- Describe the operation of a cyclone grit separator.
- Explain atoms and molecules of water.
- Explain acids, bases, and salts.
- Explain the hardness of water.
- Describe other unwanted chemicals.
- Describe dissolved oxygen.
- Explain pathogenicity.
- Explain disinfection.
- Explain the stabilization of organic matter.
- Explain the biochemical oxygen demand.
- Explain factors affecting growth.
- Describe the food chain.
- Explain the types of living things.
- Define bacteria.
- Define the environmental classifications of bacteria.
- Explain bacteria in treatment plants.
- Describe the water cycle.
- Define precipitation.
- Describe surface runoff.
- Define groundwater.
- Describe how we use water.
- Explain municipal use.
- Explain industrial use.
- Explain agricultural use.
- Explain waste disposal.
- Explain waste not - want not.
- Describe the beginning of waterworks.
- Describe Roman waterworks.
- Describe centuries of neglect.
- Describe the beginning of water treatment.

- Describe how we are upgrading water today.
- Describe collecting surface water.
- Describe collecting ground water.
- Explain transmission of water.
- Explain why we treat the supply water.
- Describe types of treatment.
- Explain treatment in the treatment plant.
- Explain distributing treated water.
- Describe collecting wastewater.
- Describe treating wastewater.
- Describe primary treatment.
- Describe secondary treatment.
- Describe tertiary treatment.
- Explain why grit removal is important.
- Name the three phases of the grit removal process.
- Explain the functions of slide gates and dewatering drains in handcleaned grit chambers.
- Describe the action of a reciprocating rake and explain its purpose.

382 Wastewater Treatment Processes

- Explain the purpose of treatment.
- Name sources of wastewater.
- Describe wastewater collection systems.
- Describe typical treatment facilities.
- Explain influent.
- Explain preliminary treatment.
- Explain secondary treatment.
- Explain tertiary treatment.
- Describe disinfection and effluent discharge.
- Explain solids handling.
- Explain the screening process.
- Explain the grinding process.
- Explain grit removal.
- Explain primary sedimentation.
- Explain what happens during sedimentation.

- Describe factors affecting settling rates.
- Name the types of clarifiers.
- Explain air flotation.
- Explain filtration.
- Describe effluent disposal.
- Classify solids in wastewater.
- Describe chemical coagulants.
- Explain phosphate removal.
- Name chemical clarification equipment.
- Explain disinfection.
- Name factors affecting disinfection.
- Describe disinfection with chlorine.
- Describe equipment used in chlorine feeding.
- Explain lagoons.
- Explain activated sludge.
- Explain aeration with pure oxygen.
- Describe trickling filters.
- Describe distribution systems.
- Explain trickling filter operations.
- Describe synthetic media.
- Describe the activated biofilter process (ABF).
- Describe the rotating biological contactors (RBC).
- Explain secondary clarifiers.
- Explain the three processes.
- Describe sludge conditioning.
- Describe thickening.
- Describe dewatering.
- Explain drying beds.
- Explain vacuum filtration.
- Describe filter presses.
- Describe the further reduction of water content.
- Explain composting.
- Explain ultimate disposal.

383 Maintaining Wastewater Equipment

- Discuss the daily maintenance requirements of clarifiers.
- Explain the importance of laboratory testing on the contents of a clarifier.
- Identify possible safety hazards associated with clarifier operation.
- Define flow and differentiate between flow rate and total flow.
- List the three basic types of flow systems.
- Distinguish between direct and indirect flow measurements, and between primary and secondary devices.
- Give a brief description of a current meter, a pitot tube, a weir, and a flume, and tell how each functions in open channels.
- Describe several methods of measuring flow from freely discharging pipes.
- Name at least five level detection devices and explain their operation.
- Describe the following flow measurement devices as they are used in completely filled pipes: orifice, venturi, flow nozzle, rotameter, magnetic flowmeter, and ultrasonic flowmeter.
- Describe the operation of slotted-pipe and helicaltype skimmers.
- Give examples of important safety rules to follow when working with screening and grinding equipment.
- Tell why grit removal is important.
- Name the three phases of the grit removal process.
- Explain the functions of slide gates and dewatering drains in handcleaned grit chambers.
- Describe the action of a reciprocating rake and explain its purpose.
- List several maintenance checks to make on chain and flight grit collectors.
- Explain how an aerated grit chamber works and how to tell if it is not working correctly.
- Describe the operation of a cyclone grit separator.
- List the five major components common to all clarifiers.
- Use the following terms in an explanation of pump operation: impeller, shroud, volute case, stuffing box, shaft sleeve, wearing ring.
- Name the importance of a pump station ventilation system.
- Demonstrate the necessary procedures to follow before pump start-up.
- Name the two basic parts of a hand-cleaned bar screen and explain their functions.
- Describe the operation of a mechanically cleaned bar screen.
- Explain why grinders are used and how they are maintained.

- Compare and contrast a rotating drum comminutor and a stationary screen comminutor with an oscillating cutter.
- Explain how a barminutor combines the functions of a bar screen and a comminutor.
- Name the three types of pumping stations currently in use and explain how they differ.
- Describe a typical collection system layout.
- Name the two flow patterns possible in circular clarifiers.

WorkForge

Aircraft Familiarization

AER-1004 Airplane Control

- Identify the three axes of control
- Explain the center of gravity of an airplane
- Identify the control systems of an airplane
- Identify the nine type of stability

AER-1005 Aircraft Configuration

- Identify airplanes based on their commercial purpose
- Identify airplanes based on their wing location
- Identify airplanes based on their tail configuration
- Identify airplanes based on their engine type and location
- Explain the advantages of each configuration

AER-1006 Aircraft Materials

- Identify the types of materials used in aircraft construction
- Identify the properties of each material
- Understand the process of selecting the proper materials
- Explain the strengths and weaknesses of each type of material

AER-1007 Aircraft Construction

- Identify the major types of aircraft construction
- identify the components of an airframe
- Identify the construction methods used in aircraft manufacturing

AER-1008 Aircraft Corrosion

- Define corrosion
- Explain the corrosion process

- Identify the conditions that must exist for corrosion to occur
- Recognize different types of corrosion
- Identify common corrosive agents
- Identify metals that are subject to corrosion
- Identify preventative measures for corrosion

AER-1009 Aircraft Regulations

- Define the purpose of regulations
- Identify the culture and behavior of regulation
- Define the purpose of inspection in the aviation industry
- Identify customer expectations
- Recognize different regulatory bodies and their roles in aviation
- Identify why aviation is regulated

AER-2002 - Chemical Safety

- Define a physical hazard in relation to working with chemicals
- Define a health hazard in relation to working with chemicals
- List some potential physical hazards associated with chemicals
- List some health hazards associated with chemicals
- Understand what is meant by exposure to a chemical
- Understand some of the personal protective equipment used to minimize your exposure to chemicals

AER-2007 - Wiring In Airplanes

- List the uses of wires in airplanes
- List the components of wires
- understand the differences between material classes of wire

CNC Machining Center Operator - Level 1

CNC-2007 CNC Machining Center Movements

- Define movements on the Z-axis
- Define movements on the Y-axis
- Define movements on the X-axis
- Describe the machine coordinate system
- Define machine home
- Describe the part coordinate system

- Define part zero
- Describe how ordered triplets are used to define the geometry of a part

CNC-2008 Workpiece and Tool Holding Devices for a CNC Machining Center

- Describe how an automatic tool change occurs
- List the components of a fixture
- List the components of a tool holder
- List the components of a vise
- Identify common workholding devices

CNC-2009 The CNC Controller for a CNC Machining Center

- Describe the side panel controls
- Describe how the Shift key works
- List the areas of the keyboard
- Identify the five main areas of the CNC controller
- List the areas of the display screen
- Describe how the operator controls work

CNC-2010 Auxiliary Systems for a CNC Machining Center

- Describe how the lubrication system works
- Describe how the coolant system works
- Describe how the chip removal system works

CNC-2011 CNC Machine Lubricants

- Distinguish between lubricating oils and greases
- Identify advantages of grease over lubricating oil
- Identify ingredients in lubricating oil and grease
- Define viscosity

CNC-4015 Maintenance Tasks for a CNC Machining Center

- Check the coolant level
- Fill the coolant tank
- Check the air pressure
- Check the level of lubricating oil
- Check the level of grease

CUT-2008 Cutting Fluids

- Distinguish between cutting oil, soluble oil, and synthetic cutting fluids
- List properties of cutting oils
- List properties of synthetic cutting fluids
- List properties of soluble oil
- List ingredients in soluble oils
- Understand how to use a refractometer

NDE-3038 The NDE Process

- Define terminology used in the field of NDE
- Describe where NDE is used
- Describe different methods of NDE
- Describe the NDE process

Introduction to Logistics

[LOG01] What is Logistics?

- Define logistics
- Identify key accomplishments in the history of logistics
- Identify the main types of logistics
- Describe the fundamental tasks associated with logistics
- List the top logistics companies in Indiana

[LOG02] Logistics Technology

- Differentiate among the various technologies that enable and support material handling
- Differentiate among the various technologies that enable and support supply chain management
- Identify the main categories associated with material handling

[LOG03] Inventory

- Describe what inventory is and its importance
- Define lead time and its effect on inventory
- Determine the appropriate amount of inventory needed based on the situation
- Define Just-In-Time inventory
- Differentiate among the three types of inventory costs
- Describe how inventory management works
- Identify different types of inventory packaging

[LOG04] Distribution and Transportation

- Define product distribution and describe its importance
- Define warehousing and describe its role in supply chain management
- Identify steps involved in order processing
- Define material handling systems and describe how they function
- Identify different modes for transporting goods

[LOG05] Safety, Quality and the Environment in Logistics

- Describe the importance of safety and safety education in logistics
- Define quality as it relates to logistics
- Describe and define "green logistics"

[LOG06] Winning in Logistics

- Explain how delivery, safety, environment and customers influence success
- Recognize logistics teamwork strategies
- List the main elements that can help a logistics company "win"
- Understand how costs help determine a logistics company's success

[LOG07] Careers in Logistics

- Describe how teams and individuals work together to prepare products for delivery
- Describe various roles and responsibilities within logistics teams
- Articulate the overall mission of a team
- Identify teams that work together in the logistics world

Introduction to Manufacturing Careers - Level 1 - WorkForge

AER-1001 The History of Aviation

- Identify the key milestones in aviation history

AUT-1001 Introduction to Automation

- List the power sources of some automated processes
- Identify different types of components used in pneumatic/electro-pneumatic installations or circuits
- Understand the role and importance of automated processes

CNC-1001 Introduction to Machining

- Identify different classifications of tools
- List methods of removing metal

- List methods of shaping metal
- List common machining operations

ELE-1001 Production of Electricity

- Understand the term energy
- List methods to produce electricity
- Understand the concept of conservation of energy
- List several forms of energy
- Understand the difference between kinetic and potential energy

LOG-1001 What is Logistics?

- List the top logistics companies in Indiana
- Describe the fundamental tasks associated with logistics
- Identify the main types of logistics
- Identify key accomplishments in the history of logistics
- Define logistics

LOG-1007 Careers in Logistics

- Identify teams that work together in the logistics world
- Articulate the overall mission of a team
- Describe various roles and responsibilities within logistics teams
- Describe how teams and individuals work together to prepare products for delivery

MFG-1001 What is Advanced Manufacturing?

- Define advance manufacturing
- Identify things you use in your life that are manufactured
- List the top manufacturing industries in the United States
- List the top manufacturing industries in Indiana

MFG-1002 Manufacturing History and Technology

- List software technologies designed to help in the manufacturing process
- List manufacturing hardware that is used in modern advanced manufacturing
- Describe how connectivity on the macro and micro levels affects advanced manufacturing
- Explain events that influenced manufacturing throughout history

MFG-1007 Careers in Manufacturing

- Identify teams that work together in the advanced manufacturing world
- Articulate the overall mission of a team
- Describe various roles and responsibilities within advanced manufacturing teams
- Describe how teams and individuals work together to manufacture quality products

NDE-3003 Careers in NDE

- Distinguish between qualification and certification
- List the two practices of certifying NDE technicians
- List common levels of NDE technicians
- Understand the training and work experience requirements for the various levels and NDE methods
- List common aerospace standards that recommend the training and work experience requirements

PLC-1002 Introduction to Digital Electronics

- Define digital electronics
- Identify the number systems used by PLCs
- Identify the data types used by PLCs
- Identify and define the logic gates used in PLC programming
- Understand how logic gates function
- Identify the symbols for logic gates

PRO-1001 What is Project Management

- List some common reasons why projects fail
- Explain the importance of project management training
- Describe the key duties of a project manager
- Define the terms project, project management, and project manager

QUA-1001 Introduction to Quality

- define quality management systems
- Describe the history of quality management systems
- Define Total Quality Management (TQM)
- List the principles of TQM
- Identify who is involved in quality
- Give examples of how customers and companies benefit from quality systems

- Define quality, customer, and expectations
- Identify the source of expectations

ROB-1001 Introduction to Robotics

- List common tasks of industrial robots
- Distinguish between the types of industrial robots
- Understand the history of industrial robots

SAF-1001 Introduction to OSHA

- Describe OSHA's role in workplace safety
- Understand what an OSHA standard is
- Know who OSHA does and does not cover
- List employee and employer rights under OSHA

WEL-2001 Introduction to Welding

- Identify weld discontinuities
- Understand weld and welding symbols
- Identify joints and associated weld types
- List the basic arc welding process

Introduction to Manufacturing Careers - Level 2 - WorkForge

ADM-1002 Introduction to 3D Metal Printing

- Define metal 3D printing
- Discuss the advantages of 3D printing
- Describe the forms of metal material used in 3D printing
- Briefly describe each classification of 3D printing
- List the products made by metal 3D printing

AER-1002 Primary Assemblies of an Aircraft

- Identify the primary assemblies of an airplane
- identify the components of each of the primary assemblies
- Explain how the primary assemblies work together

AER-1003 Principles of Flight

- Identify the four forces that act upon an aircraft
- Explain the impact of atmospheric pressure on an airplane
- Explain the principles of lift

- Explain the function of an airfoil

CMP-1001 Background and History of Composites

- Define a composite material
- List the two constituents of composite materials
- List types of composite materials
- List the major purpose of a binder
- List the major purpose of a reinforcement

CNC-1003 CNC Controllers

- Understand the history of CNC machine tools
- Identify the major areas of a CNC controller
- Identify common features on a CNC controller

HYD-1001 Introduction to Hydraulics

- Understand fluid power
- Define hydraulics
- Describe the differences between hydrostatic and hydrodynamic systems
- List the advantages of a fluid power system
- Identify the basic components of a fluid power system
- Compare a hydraulic and pneumatic system
- Compare four different types of power systems

LEA-1001 Lean Principles

- Define and describe the concepts of lean, including pull and perfection
- Use a value stream map to identify waste
- Define and describe the elimination of waste using tools like 5S, kaizen, and poke-yoke
- Describe the theory of constraints
- Identify the terms used to describe waste
- Define value, value-added, and non-value-added
- Explain value

LOG-1002 Logistics Technology

- Differentiate among the various technologies that enable and support supply chain management
- Differentiate among the various technologies that enable and support material handling
- Identify the main categories associated with material handling

MAT-2001 Introduction to Metals

- Identify metal products
- Recognize a periodic table and the metals, nonmetals, and metalloids classifications
- Define metals, nonmetals, and metalloids
- Describe and compare the properties of metals, nonmetals, and metalloids
- Explain that metal, nonmetal, and metalloid elements can be combined to form metal alloys
- Explain why machinability is important
- Describe the mechanical properties of metals, including strength, toughness, ductility, malleability, brittleness, and hardness
- Identify and compare methods of testing hardness
- Describe and compare how metal parts are formed and how mechanical properties affect metal forming

MEA-2001 Introduction to Precision Instruments

- Explain the difference between precision and accuracy
- Identify the resolution of a precision instrument
- Determine the discrimination of a precision instrument
- Identify the basic components of a measurement

MTC-1001 Introduction to Abrasive Waterjet Cutting

- Define abrasive waterjet cutting
- List products made by abrasive waterjet cutting
- Explain the process of abrasive waterjet cutting
- Describe the equipment needed for abrasive waterjet cutting

MTF-1001 Introduction to Metalworking Processes

- Define metalworking
- List the three categories of metalworking processes
- Understand the skills needed to be successful in metalworking
- Explain safety precautions when metalworking

PLC-1001 Introduction to Programmable Controllers

- Describe the historical evolution of programmable controllers
- Understand the role and importance of programmable controllers in automated processes

- Become familiar with the most typical applications of programmable controllers

PNE-1001 Introduction to Pneumatics

- Define pneumatics
- Define compressed air
- List the advantages of compressed air
- Explain the importance of pneumatics in automation
- List industrial and commercial applications where pneumatics are used
- Explain the historical evolution of compressed air technology

WEL-2004 Welding Basics

- Explain how welding affects metallurgy
- Explain the basic joint types
- Describe the fillet welds and butt welds
- List the different welding positions
- Describe three AWS-recognized welding processes
- Define welding

Workforce Publisher

Health & Safety

SAF-1001 Introduction to OSHA

- Describe OSHA's role in workplace safety
- List employee and employer rights under OSHA
- Know who OSHA does and does not cover
- Understand what an OSHA standard is

SAF-1002 The Job Analysis Process

- Learn how to conduct a successful job analysis
- Learn about OSHA inspections
- Learn about OSHA Citations and Penalties
- Learn about Workplace Violence and guidelines to prevent it
- Learn about substance abuse and how to spot it in the workplace

SAF-1003 Developing an Emergency Action Plan

- Learn about emergency action plans
- Learn about first aid in the workplace

- Learn about bloodborne pathogens and techniques for managing and minimizing potential exposure to them

SAF-1004 Hierarchy of Controls

- Learn about Hierarchy of Controls
- Learn about PPE
- Learn how to conduct a hazard assessment
- Learn about different types of hazards
- Learn how to appropriately identify PPE for the workplace

SAF-1005 Eye and Face Protection

- Learn about eye and face protection
- Learn about some common types of eye and face PPE

SAF-1006 Head Protection

- Learn about head protection in the workplace
- Learn how to properly maintain hard hats

SAF-1007 Foot and Leg Protection

- Learn foot and leg protection in the workplace
- Learn about the different types of foot and leg PPE

SAF-1008 Hand and Arm Protection

- Learn about hand and arm PPE
- Learn about the different types of PPE gloves

SAF-1009 Body Protection

- Learn about the Body Protection in the workplace

SAF-1010 The Need for Hearing Protection

- Learn about the why it is important to have hearing protection
- Learn about choosing the appropriate PPE for hearing protection

SAF-1011 Recognizing Respiratory Hazards

- Learn about the different respiratory hazards that can occur in the workplace
- Learn about different types of respiratory equipment
- Learn about the proper guidelines to follow for respiratory protection

SAF-1012 Hazardous Materials

- Learn about hazardous materials
- Learn about different forms of hazardous materials
- Learn about why it is important to know the hazards in the workplace
- Learn about how hazardous material can affect the body

SAF-1013 Hazcom

- Learn about HazCom in the workplace
- Learn how to decipher HazCom labels
- Learn what goes into safety data sheets

SAF-1014 Hazardous Waste

- Learn about Hazardous Waste

SAF-1015 Hazmat Storage

- Learn about HAZMAT storage
- Learn about proper storage methods for HAZMATs

SAF-1016 Workplace Housekeeping

- Learn about workplace housekeeping
- Learn about keeping walkways clean and exit routes
- Learn about Workplace Safety Ergonomics
- Learn about smart practices you can implement to make the workplace safer
- Learn about proper methods for lifting in the workplace

SAF-1017 Permit-Related Safety

- Learn about permit-related safety in confined spaces
- Learn about controlling hazards in permit spaces
- Learn about the requirements for Entry permits for certain work areas
- Learn about permit-related safety training

SAF-1018 Fall Prevention

- Learn about fall prevention in the workplace
- Learn about fall prevention protection systems
- Learn about Aerial Lift Safety
- Learn about Scaffold Safety

SAF-1019 Ladder Safety Guidelines

- Learn about Ladder Safety
- Learn how to properly set up a ladder
- Learn about some different types of ladders available

SAF-1020 Electrical Safety

- Learn about the Introduction to Electrical Safety
- Learn about Electrical Safety Guidelines
- Learn about How Electricity Works
- Learn about Electrical Hazards

SAF-1021 Lockout Tagout

- Be introduced to the lockout/tagout process
- Learn about performing an electrical lockout/tagout
- Learn about the components of lockout/tagout
- Learn about performing a pneumatic lockout/tagout

SAF-1022 Fire Safety

- Learn about how fires start
- Learn about the classes of fires in fire safety
- Learn about fire safety guidelines
- Learn about fire drills

SAF-1023 Fire Extinguishers

- Learn about the Introduction to Fire Extinguishers
- Learn about the Different Types of Extinguishers
- Learn about Selecting, Using, and Testing Fire Extinguishers

SAF-1024 Material Handling Basics

- Learn about material handling basics
- Learn about safe practices for storing and stacking materials
- Learn about safety and injury prevention in material handling

SAF-1025 Powered Industrial Trucks

- Learn about powered industrial trucks
- Learn about the classes of powered industrial trucks
- Learn about operating and handling materials with forklifts

- Learn about conveyor systems in material handling

SAF-1026 Crane Basics

- Learn about crane basics
- Learn about crane hazards and safety guidelines
- Learn about rigging basics
- Learn about lifting a load and rigging safety
- Learn about sling basics
- Learn about safe lifting practices and sling safety
- Learn about the essential guidelines for safe sling usage

SAF-1027 Hand Tool Safety

- Learn about hand tool safety guidelines
- Be introduced to hand tools and the possible hazards or injuries that can result from misuse and improper maintenance
- Learn about cutting tool safety guidelines

SAF-1028 Power Tool Safety

- Learn about power tool safety
- Learn about electric power tool safety
- Learn about portable power tool safety
- Learn about pneumatic tools safety

SAF-1029 Sheet Metal Safety

- Learn about sheet metal safety
- Learn about compressed gas safety

SAF-1030 Machine Operation Safety

- Be introduced to machine safety
- Learn about machine operation safety
- Learn to identify mechanical hazards
- Learn about machine safeguard requirements

SAF-1031 Introduction to Safety Devices

- Learn about safety devices
- Learn about presence-sensing safety devices
- Learn about pullback safety devices

- Learn about restraint safety devices
- Learn about safety controls
- Learn about other safeguarding devices

Marketing

GoSkills

Introduction to Marketing

Intro to Marketing: 03 Create a Marketing Plan

- Create a simple, effective marketing plan
- Articulate a compelling message to build rapport with your audience

Intro to Marketing: 05 Get Online

- Use social media, blogs, and websites to attract more customers to my brand.

Intro to Marketing: 08 Final Exam

- Completion

Intro to Marketing: 01 Articulate Your Product or Service

- Create a bold promise that will grab the attention of my prospects

Intro to Marketing: 02 Define Your Ideal Client

- Identify my ideal client and how to connect with them

Intro to Marketing: 04 Creating Marketing Content

- Create marketing content with items of value
- Understand the advertising framework for any medium

Intro to Marketing: 06 Promote

- Promote my services through email campaigns, print/online advertising.

Intro to Marketing: 07 Track, Measure and Adjust

- Convert prospects into customers and fans.

Open Textbooks

Foundations in Digital Marketing

FIDM: 01 Fundamentals of Digital Marketing

- Define what digital marketing is and its global importance
- Explain the POEM Framework
- Describe the influence Indigenous storytelling has had on storytelling
- Explain the fundamental structure of telling stories
- List key storytelling techniques and questions to answer
- Define visual storytelling
- Explain why visual storytelling is important
- Explain what sketchnoting is
- Translate concepts, ideas, and objects into visual metaphors
- Define segmentation, targeting, and positioning (STP)
- Explain the STP Framework
- Define what a customer / buyer persona is
- Explain the key steps in developing data-driven customer personas
- Describe internal and external data sources used to develop customer personas
- Analyze a data-driven customer persona
- List the pros and cons of customer personas
- Explain what a customer journey is
- Develop insights across the entire customer journey / lifecycle
- Describe the benefits of a customer journey

FIDM: 03 Analyzing and Optimizing Your Digital Marketing Performance

- Describe what A/B testing is and how to use it
- List several common areas to A/B test
- Explain the required steps to conduct an A/B test
- Name several online tools that support A/B testing
- Explain what marketing attribution is and how to use it
- Describe several marketing attribution approaches
- List several analytics tools for tracking marketing activities
- Describe several common digital marketing KPIs and their purpose
- Calculate return on investment (ROI) and return on ad spend (ROAS)
- Explain ways to track your digital marketing activities

- List the required steps to develop a marketing attribution model
- Name several online tools that provide marketing attribution
- Explain the relationship between conversion rate optimization (CRO) and customer journeys
- Describe the key areas affecting CRO

FIDM: 02 Generating Customer Demand and Nurturing Leads and Prospects

- Explain the different types of email and how they are used
- Describe ways to prevent emails from being marked as spam
- Evaluate and improve email marketing performance
- Create effective content for email marketing
- List the different types of Google Ads
- Describe why social media is important
- Develop a social media strategy and plan
- Explain the 6-Step Social Media Marketing Framework
- Differentiate between the various types of social media networks
- Explain how to develop a mobile marketing strategy
- Describe several mobile-specific content options
- Identify key factors that are unique in mobile experiences
- Determine unique opportunities for targeting mobile users
- Explain why email marketing is important to digital marketing
- List the seven steps of an email marketing campaign
- Describe several content marketing do's and don'ts
- Explain what search engine optimization (SEO) is
- Describe the differences between on-site and off-site SEO
- Conduct a website audit
- Describe the key elements of a successful landing page
- Explain key paid advertising concepts, structures, & terminology
- Describe the basics of keyword bidding
- Explain various types of leads and lead generation
- Describe the key elements of a 5-Step Lead Generation Framework
- Provide examples of how to apply a lead generation strategy
- Develop a content marketing strategy
- Map appropriate content types across your conversion funnel
- Explain the purpose of content calendars

FIDM: 04 The Future of Digital Marketing

- Describe ways new technologies and tools might impact digital marketing in the future
- List five key digital marketing trends

Global Marketing In a Digital World

GMDW01: Introduction to Global Marketing

- Define global marketing and its key concepts
- Differentiate between domestic and global value chains, highlighting their components.
- Analyze the motivations for firms entering or avoiding international markets.
- Distinguish between various marketing approaches: domestic, international, export, multinational, and global marketing.
- Summarize the advantages and drawbacks of global marketing for firms and managers.

GMDW02: The Economic and Political Environment

- Highlight the significance of the economic environment.
- Explore the consequences of inflation, deflation, and balance of payments.
- Emphasize the importance of the political environment and define political risk.
- Analyze the impact of government policy changes on international marketing and define legal risk.
- Summarize the importance of the legal environment.

GMDW03: Social and Cultural Environment

- Explore external factors shaping the global marketing environment.
- Enumerate elements within a firm's cultural environment.
- Emphasize the impact of culture on markets and define it.
- Identify various types of culture.
- Define and utilize Hofstede's and Hall's cultural categories, along with other culture determinants.

GMDW04: Global Market Planning

- Recognize factors for global market selection.
- Detail CAGE analysis components.
- Clarify strategies for addressing institutional voids.
- Perform Country Attractiveness Analysis for market entry.
- Define market segmentation and key demographic variables, explaining target market selection principles.

GMDW05: Competing in a Global Marketplace

- Identify components of a firm's external micro environment, explain Porter's Five Forces, and discuss building competitive advantage strategies and determining a firm's strategic position.
- Explain the strategic analysis process and its significance for firms.
- Outline PESTEL analysis components.
- Identify elements of a firm's external macro environment.
- Highlight the importance of SWOT analysis in global competition assessment.

GMDW06: Global Market Entry Modes

- Define and describe the five common international-expansion entry modes.
- Explain why companies would select each mode of entry.
- Discuss the advantages and disadvantages of each entry mode.

GMDW07: Global Products

- Define consumer product categories.
- Explain the product life cycle.
- Discuss marketing considerations during the product life cycle.
- Describe the stages of new-product development.
- Highlight the trade-offs between standardized and customized products, dimensions of value proposition adaptation, drivers behind adaptation, advantages of a global innovation strategy, steps in a firm's global innovation strategy, BOP market characteristics, and firms pursuing BOP strategies

GMDW08: Global Pricing

- Explore global marketers' perspectives on pricing, approaches to global pricing determination, penetration vs. skimming strategies, and the impact of currency fluctuations on global pricing
- Explain customer-centric pricing
- Describe business pricing objectives.
- Discuss discount and allowance methods.
- Apply pricing fundamentals to the global context.

GMDW09: Global Distribution

- Describe channel partners' roles.
- Explain wholesale intermediaries' functions.
- Describe types of retailers in product distribution.

- Differentiate supply chains from distribution channels and outline global sourcing advantages, sole-sourcing, multisourcing, and distribution management in international markets.
- List distribution channel characteristics and flows.

GMDW10: Global Promotion

- Explain integrated marketing communication (IMC).
- Explain the promotion mix.
- Describe common marketing communication methods, including their advantages and disadvantages.
- Explain how organizations use IMC to support their marketing strategies.
- List driving factors in global promotion decisions.

GMDW11: The Global Marketing Plan

- Explain how the marketing plan is used to track progress, evaluate impact, and adjust course where needed.
- Explain why and how to update the marketing plan.
- Outline the decision sequence in international marketing.
- Explain how the marketing mix elements are integrated in the international marketing plan.
- Explain how the basic principles of marketing apply to global marketing.

GMDW12: Creating a Global Brand

- Discuss global branding's pros and cons.
- Identify centralized vs. decentralized decision-making trade-offs.
- Describe branding challenges in emerging markets and multinational company brand structures.
- Explain corporate brand endorsement's value.
- Outline brand architecture elements.

GMDW13: Introduction to E-Commerce

- List major e-business categories.
- Describe e-commerce pros and cons.
- Outline the business-to-consumer e-commerce cycle.
- Summarize major e-commerce models and discuss related technologies and emerging trends like social commerce and New Retail.
- Define e-business and e-commerce, differentiating between them.

GMDW14: Emerging Technology

- Discuss the history of artificial intelligence.
- Describe the difference between the Internet and World Wide Web.
- Define artificial intelligence and distinguish between the types.
- Explain autonomous and extended reality technologies.
- List some of the emerging technology trends and their impact on business.

Intro to Social Media

ISM01: Marketing Principles

- Understand the evolving landscape of marketing in the digital age, particularly during the COVID-19 pandemic
- Apply basic marketing principles to social media marketing strategies, recognizing the importance of the "Four P's" in a digital context.

ISM02: Crafting a Social Media Strategy for Your Business

- Identify the key elements of developing a successful social media strategy, including understanding your target audience and competition
- Utilize the "See, Think, Do, Care" framework to create a comprehensive social media strategy that integrates content, marketing, and measurement.

ISM03: Social Media 101

- Explore the significance and unique characteristics of major social media platforms such as Twitter, Facebook, Instagram, YouTube, TikTok, and LinkedIn
- Recognize the role of analytics as the foundation of an effective social media strategy and leverage third-party tools and AI for optimization and time management

Sport Marketing

Sport Marketing: 03 MARKETING RESEARCH, EVALUATION AND CONTROL

- Understand the basic procedures for conducting marketing research
- Understand the types and the importance of marketing research
- Understand the different research design and data collection methods
- Utilize the obtained information and findings (either qualitative or quantitative) to perform evaluation and controlling function

Sport Marketing: 05 THE PRODUCT OF COLLEGE ATHLETICS

- Understand the definition of sports products and categorizations of products and services
- Discover the branding concepts and process
- Discuss the product life cycle and factors that lead to innovation and diffusion of new products
- Identify various dimensions of collegiate athletics as a sports product and managing process of this product

Sport Marketing: 06 ENGAGING THE PRICE WAR: TICKET AND MERCHANISE SALES

- Understand the relationship among price, value, and benefits
- Understand the relationship between price and the other marketing mix elements
- Explain how pricing decisions are influenced by competitive environment
- Explain how costs and organizational objectives may affect pricing decisions

Sport Marketing: 09 THE "FAMMOUS" MODEL FOR OPERATING BUSINESS

- Review the concepts for developing a strategic sport marketing plan, and apply those concepts by adding the human component ("people") in the actual practices
- Identify all the elements within the FAMOUS star model and understand the interactions and relationships among the various different elements.

Sport Marketing: 01 INTRODUCTION OF SPORT MARKETING

- Learn the revised marketing mix (the 6Ps model)
- Explore the current marketing trends at the professional, intercollegiate, and other levels of sports
- Understand the score and unique nature of sport marketing
- Define sport marketing

Sport Marketing: 02 STRATEGIC MARKETING MANAGEMENT

- Learn to develop a strategic marketing plan by using the PIE contingency framework
- Appreciate the process of implementing and controlling a marketing plan
- Learn to perform analysis for making sound marketing decisions through WORST case analysis model
- Identify appropriate marketing goals and objectives
- Understand the concept of strategic sport marketing

Sport Marketing: 04 SPORTS FANS: UNDERSTAND THEM AND GET THEM

- Understand the simplified model of general sports consumption behavior model
- Recognize and identify factors that influence the decision-making process
- Identify the basic fan motivation factors
- Understand the implications of fan identification model
- Compare the various basis for marketing segmentation
- Understand how to target the desired market and use positioning to achieve the goals
- Distinguish the differences and similarities between consumers as sports participants and spectators

Sport Marketing: 07 PROMOTION AND SPONSORSHIP IN COLLEGIATE ATHLETICS

- Understand the element of the promotion mix and emerging forms of promotion
- Specify the importance of public or community relations to sports marketers
- Understand the importance, effectiveness, and objectives of sponsorship
- Develop a sponsorship idea as a promotion mix element

Sport Marketing: 08 CHANNELS OF DISTRIBUTION

- Discuss the importance of operations and facility management in sport marketing
- Appreciate the marketing mix associated with facility elements such as accessibility, design, venue amenities, and staffing
- Understand the scope, impact, and effectiveness that new technology and social media have brought to the sports world.

Sport Marketing: 10 END NOTES & FUTURE MARKETING TRENDS

- Identify and outline the future trends and challenges facing collegiate sport marketers.
- Identify and understand the key legal issues and concerns associated with the sport marketing industry
- Identify the skills and opportunities for entry and advancement in sport marketing industry

Pointful Education

Meta Social Media

Meta Social Media 00

- Completion

Meta Social Media 01: The Value of Meta

- Understand Meta technologies and their practical applications.
- Explore the utilization of Meta technologies for establishing a robust online presence.
- Explain effective strategies for engaging with an audience and fostering business growth.
- Assess and set an ad campaign budget, utilizing Meta Ads Manager to establish spending limits.
- Determine how to implement a structured schedule for marketing campaigns and understand its purpose in achieving marketing objectives.

Meta Social Media 02: Establishing a Platform Presence Part I

- Acquire the skills to proficiently create and modify a Facebook page.
- Recognize the suite of Facebook tools tailored for business applications.
- Articulate the process of building a Facebook page following and posting content on a business page.
- Understand techniques for establishing an online presence for a business using the complimentary tools and features within an Instagram business account.
- Explore the creative functionalities and communication tools available on Instagram to effectively engage and connect with customers.

Meta Social Media 03: Establishing a Platform Presence Part II

- Gain insights into the significance of a WhatsApp Business account, its setup process, and strategies for effective customer engagement.
- Comprehend the functionalities and utilities embedded within Meta Business Suite.
- Employ Meta Business Suite tools to efficiently oversee your online presence across both Facebook and Instagram. This includes customer interaction, Messenger utilization, ad creation, and business expansion, all centralized for streamlined management.
- Acquire the skills to engage with customers through Messenger, utilizing its tools for more efficient and effective communication.

Meta Social Media 04: Advertising Fundamentals

- Gain proficiency in generating ads through Facebook Ads Manager from a Facebook account.
- Develop proficiency in crafting ads using Instagram Ads Manager from an Instagram account.

- Assess the advantages of integrating business goals into advertising strategies.
- Align specific business objectives with corresponding ad objectives for strategic coherence.
- Understand the methodologies for measuring the effectiveness and success of advertisements.

Meta Social Media 05: Creating and Managing Ads Part I

- Articulate the concept of defining target audiences when constructing ad campaigns.
- Analyze and differentiate between new audiences, Custom Audiences, and lookalike audiences.
- Employ Meta Ads Manager proficiently to generate new audiences, Custom Audiences, and lookalike audiences.
- Master the application of audience segmentation while strategically mapping ideal audiences into ad sets.
- Recognize the utilization of sources for Custom Audiences and ensure the quality of generated lookalike audiences.

Meta Social Media 06: Creating and Managing Ads Part II

- Comprehend the significance of establishing a campaign budget within Meta Ads Manager.
- Choose the optimal ad placement and format tailored to a specific business goal.
- Apply delivery tips to effectively connect with an estimated customer base.
- Understand the strategic deployment of creative elements and action buttons to enhance the impact of an advertisement.

Meta Social Media 07: Creating and Managing Ads Part III

- Develop compelling ad text (copy) and select suitable images and videos for effective ad creation
- Evaluate and differentiate the capabilities and advantages of both the Meta Pixel and the Conversions API.
- Apply the Meta Pixel and Conversions API proficiently to analyze data stemming from both standard and custom customer events.

Meta Social Media 08: Reporting

- Understand how to navigate and adjust privacy settings across Facebook, Instagram, WhatsApp, and Messenger.

- Articulate the methods through which individuals can manage and control their shared content, emphasizing data aggregation through data hashing.
- Recognize prevalent reasons for the rejection of ad copy, creative elements, and landing pages to enhance advertising compliance.

Meta Social Media 09: Wrap Up/Final Exam

- Completion

Social Media Business Marketing

SMBM 00: Introduction to Social Media

- Completion

SMBM 01: Social Media in Business Part I

- explain what engagement is in social media and how it is measured, including conversation volume, applause, sentiment, and amplification.
- Identify common types of tools used with social media and explain what kind of information they provide.
- explain factors that influence the facilitation of social media throughout a business, including executive buy-in, company culture, organizational structure, and organizational arrangement.
- plan social media for a fictitious business, including the business mission and its SMART core business and organizational goals.
- explain how using crowdsourcing and crowd-shaping in social media have affected business innovation.
- Identify social media positions and the tasks and responsibilities of each role.

SMBM 02: Social Media in Business Part II

- Given a scenario, determine the impact on a business of implementing social media, including budgets, staffing, training, and policies.
- Explain the types of communication links that can exist with businesses using social media.
- Describe organizational assets to leverage in a social media campaign, such as content, social media accounts, employees, influencers, and company-specific resources.
- Explain elements that can help boost brand recognition on social media, such as consistency, social profiles, social voice and tone, and social characters
- Create a personal online social media profile.

- List advantages and disadvantages of using social media in business.

SMBM 03: Social Media Strategy

- Describe the cycle of a social media strategy plan
- Conduct social media audits to assess the social media landscape, including brand presence, sentiment, positioning and competition
- Explain the importance of market segments that impact a social media strategy, such as geographic, demographic, psychographic and behavioral segments
- Develop social media personas for a business
- Identify the primary and secondary target social media audiences for a company, brand or product
- Perform a strengths, weaknesses, opportunities, and threats (SWOT) analysis based on a social media audit
- Explain the importance of making data-driven decisions in a business

SMBM 04: Social Media Campaigns

- Explain a typical social media campaign and provide examples from current business on the Web
- Describe project management essentials in relation to a social media campaign, including creating a social media editorial calendar
- Assemble a project team of writers, editors, graphic designers, and subject-matter experts (SMEs) to satisfy the technical and marketing needs of a social media strategy
- Gather appropriate data for a successful social media campaign and identify the appropriate metrics for determining or declaring success in social media
- Given a scenario, explain the tactics and strategies for a social media campaign, including content, timing, communication, influencers, keywords, and gamification
- Describe how to support the message of a social media campaign
- Given a scenario, create a call to action for a social media campaign
- Explain the types of content that can be used in a social media campaign. Given a scenario, create or select the appropriate content for a social media campaign
- Explain how to find, organize, and share curated content for use in social media campaigns and identify challenges of using curated content

SMBM 05: Social Media Platforms

- Choose the appropriate social media platform and find social networks for a specific industry or niche. Given a scenario, justify a social media platform choice, including business objectives for your social media campaign
- Assess the environment and audience of a social media site. Determine audience composition for a social media site, including the number of followers and various demographics
- Identify the metrics available on social media platforms
- Determine platform-specific strategies and tactics you can employ on various social media platforms
- Identify the dynamics of a social media community. Describe how to build a social media community
- Describe the primary responsibilities of a social media community manager, including being the "face" of the brand
- Identify communication strategies that allow community members to have a voice in your community
- Given a scenario, determine how to identify and work successfully with social media contributors and influencers
- Identify social media trends and ways to use them to your advantage

SMBM 06: Social Media Presentations and Blogs

- Explain how presentations (e.g., Webinars, Webcasts, podcasts and live streaming) can be social
- Develop objectives for a social presentation
- Analyze gathered data on audience needs, values and constraints for a social presentation
- Create a social presentation using a three-part structure (i.e., beginning, middle and end). Deliver a social presentation
- Use techniques to reduce speaking anxiety before and during a social presentation
- Prepare notes and visual aids for a social presentation
- Describe how to lead a question-and-answer session
- Explain how a business blog can provide multiple functions for a social media strategy

SMBM 07: Social Media Risk, Reputation, and Crisis Management

- Explain the types of risks related to social media that a business might encounter.
- Explain how organizational weaknesses can put a business at risk on social media.

- Describe the components that make up a social media crisis plan, including roles, messages and action plan.
- Explain the stages of a social media crisis, including detection, identification, response and recovery.
- Identify the steps to performing a social media risk assessment.
- Describe components of an effective social media risk management strategy, including governance, processes and systems.
- Explain the purpose and importance of social media policies.
- Describe social media data and how it might be accidentally or maliciously misused by employees or non-employees.
- Given a scenario, describe legal, regulatory and compliance issues that a business might encounter because of social media.
- Identify reputation risk factors for a business that are related to social media.

SMBM 08: Social Media Advertising Part I

- Given a scenario, identify the target objective and audience for an advertising campaign.
- Describe the differences between paid and organic social media.
- Explain how to set a social media budget for an advertising campaign.
- Describe how to measure the performance of an advertising campaign.
- Describe the type of content that makes the best ads on social media, and how to test variations of ads using A/B testing.
- Create a Facebook advertisement, selecting the appropriate ad type, audience, budget, and metrics.

SMBM 09: Social Media Advertising Part II

- Describe how to advertise on Instagram through a Facebook business page.
- Create a Twitter advertisement, selecting the appropriate ad type, audience, budget, and metrics.
- Create a LinkedIn advertisement, selecting the appropriate ad type, audience, budget, and metrics.
- Explain how to advertise on Google platforms (Google+, YouTube).
- Describe how to create a Promoted Pin on Pinterest.
- Given a scenario, describe how to select the best platform for your business.
- Describe best practices for creating social media advertising.

SMBM 10: Social Media Metrics and Analysis

- Describe strategies for analyzing big data generated from social media.
- Identify the characteristics of big data, including volume, velocity, variety, veracity, confidence, context and choice.
- Describe what social media mining is and its process.
- Describe what big data is, how it is related to social media, and the types of data that social media generates.
- Explain how to extract and archive data from social media
- Explain the process of cleaning and transforming big data so it is ready for analysis.
- Describe how visualizing big data from social media can help a company when analyzing data.
- Describe how to calculate social media ROI.
- Identify the types of social media metrics that can be used for different stages of the social media funnel.
- Describe what a conversion is in social media, how to measure conversions and the various types of conversion attribution models.

SMBM 11: Social Media Reporting and Optimization

- Describe what a social media report is and the steps for creating one.
- Identify types of social media reports and scenarios where they are useful.
- Explain how the audience should be considered when creating a social media report.
- Describe what social media optimization (SMO) is and how it fits into the social media strategy planning cycle.
- Explain how social media can be optimized by integrating it into traditional marketing campaigns.
- Describe methods of optimizing content for social media.
- Describe how metadata is used for SMO and identify the types of metadata protocols (Open Graph, Twitter Cards, and schema.org) and their tag structures.
- Explain how social media optimization (SMO) can have an impact on search engine optimization (SEO) and steps you can take to improve your SEO using SMO.

SMBM 12: Final Exam

- Completion

nan

Automated Manufacturing Products

SolidWorks Basics

Lesson 01: Introduction to SolidWorks

- nan

Lesson 02: Parts and Basic Tools

- nan

Lesson 03: Creating Your First Part

- nan

Lesson 04: Sketching Quickly

- nan

Lesson 05: Applying Materials to Parts

- nan

Lesson 06: Editing Parts

- nan

Lesson 07: Bosses, Cuts, and Patterns

- nan

Lesson 08: Assemblies

- nan

Lesson 09: Assembly Mates

- nan

Lesson 10: Mates and Toolbox

- nan

Lesson 11: Parts Drawings

- nan

Lesson 12: Assembly Drawings

- nan

Lesson 13: Evaluating Parts

- nan

Lesson 14: Shell Feature

- nan

Lesson 15: The Hole Wizard

- nan

Lesson 16: Swept Boss, Reference Planes and Loft Tools

- nan

Lesson 17: Rib Tool

- nan

Lesson 18: Feature Patterns

- nan

SolidWorks CSWA

CSWA Lesson 01

- nan

CSWA Lesson 02

- nan

CSWA Lesson 03

- nan

CSWA Lesson 04

- nan

CSWA Lesson 05

- nan

Biddeford High School

STEM Science

STEM Science - Chemistry

- nan

BRCOT

Workplace Readiness

01 Work Ethic

- Initiative
- Work Quality
- Attendance
- Punctuality
- Attitude
- Communication Skills

03 Communication and Teamwork

- Identifying team membership and role
- Establishing productive relationships
- Meeting team objectives
- Resolving conflicts

Diversity and Inclusion

- Communicating in context with different kinds of groups Communicating in verbal and non-verbal settings
- Nonverbal and Cross-cultural Communication Students will work with teams to identify and discuss barriers and opportunities to improve communication and inclusion in the workplace.
- Presentation on Disabilities
- Employee rights, things you should know

Job Acquisition

- nan

Personal Finance

- Demonstrate taking responsibility for personal financial decisions.
- Evaluate the results of financial decisions.
- Make financial decisions by systematically considering alternatives and consequences.
- Apply systematic decision making to long-term goals.
- Create a basic budget with categories for income, taxes, planned savings, and fixed and variable expenses.

Self Discovery

- nan

Self Representation

- Job acquisition
- Resume Creation
- Conducting a Professional Interview
- Presenting your best self

CBE Solutions

Introduction to Earth and Space

The Big Bang

- nan

Course Intro and Pre-assessment

- nan

The Sun

- nan

Core-LX

Job Safety 1 Vocabulary Practice

Job Safety 1 Vocab Practice

- Completion

On-boarding Tutorial Badge Stack

Depricated

- Complete a Quiz
- Complete a Discussion
- Submit an Assignment
- Complete an Interactive Lesson
- Complete a Self-Evaluation

First-Timer Badge

- Submit an Assignment

- Complete a Quiz
- Complete a Self-Evaluation
- Complete an Interactive Lesson
- Complete a Discussion

Praxis Elementary Education Test Prep

Praxis Elementary Education Mathematics: Volume and Surface Area of Rectangular Prisms

- Objective 1: Calculate the total surface area of a rectangular prism from a net or a 3-D solid diagram.
- Objective 2: Use the mathematical formula for surface area to solve real-world problems involving right rectangular prisms.
- Objective 3: Find the volume of a rectangular prism by packing it with cubes of appropriate unit fraction edge lengths.
- Objective 4: Determine the volume of a right rectangular prism using the appropriate mathematical formula.
- Objective 5: Use algebra to solve problems involving volume.

Using Kami

Unit 00: Using Kami

- Completion

Mission CIT

EMR CH E30 and E31: Multiple Casualty Incidents

EMR CH E30 and E31: Multiple Casualty Incidents

- Understand the concept of Multiple Casualty Incidents (MCI) and their significant demand on resources.
- Identify the principles and techniques of triage, including primary and secondary triage, documentation, and patient distribution.
- Recognize the importance of ongoing coordination and communication during an MCI, including consideration of specialty patient needs and hospital surge capacity.
- Develop an understanding of post-traumatic and cumulative stress and the roles of defusing and debriefing in managing it after an MCI.

MissionCIT

EMR CH E01: EMS Systems

EMR CH E01: EMS Systems

- System for continually evaluating and improving care: Explain the principles of continuous quality improvement in EMS and the dynamic process of evaluating and improving EMS care.
- Patient safety in EMS: Identify high-risk activities in patient safety in EMS, understand how errors happen and how to prevent them through environmental factors, clear protocols, and reflection in action.
- Characteristics of professional behavior in EMS: Describe the different characteristics of professional behavior in EMS, their importance in practice, and the principles of patient advocacy, certification, and personal responsibility.
- Roles and responsibilities of EMS personnel: Understand the principles of safety, patient assessment, and emergency care in EMS, as well as the importance of integration with other professionals, administrative support, and professional development.
- EMS licensure, education, and oversight: Identify the different levels of EMS licensure, understand the National EMS Education Agenda for the Future, and explain the role of oversight and clinical protocols in ensuring quality care.
- History and evolution of EMS systems: Understand the factors that led to the creation of modern EMS systems and the principles of resource management, regulations, and policies that govern EMS services.

EMR CH E02: The Well-Being of the Emergency Medical Responder

EMR CH E02: The Well-Being of the Emergency Medical Responder

- Evidence-Based Decision-Making: Understand the importance of using evidence-based decision-making in EMS practice.
- Wellness Principles: Understand the importance of physical and mental wellbeing in EMS, including physical fitness, sleep, disease prevention, and stress management.
- Standard Safety Precautions: Demonstrate adherence to standard safety precautions, including hand washing, environmental control, and safe operation of EMS equipment.
- Personal Protective Equipment: Understand the importance of personal protective equipment in preventing occupational hazards.

- Stress Management: Understand the different types of stress reactions, and learn stress management techniques such as lifestyle changes and seeking professional assistance.
- Prevention of Work-Related Injuries: Understand how to prevent work-related injuries by practicing safe lifting techniques, maintaining physical fitness and nutrition, and following Standard Precautions/OSHA regulations.
- Lifting and Moving Patients: Understand the guidelines for lifting and moving patients, including lifting techniques, safety precautions, and the use of equipment such as stretchers and cots.
- Patient Positioning: Understand the principles of patient positioning, including different positioning techniques for patients with varying medical conditions.
- Medical Restraint: Understand the use of medical restraint and the principles of the Use of Force Doctrine in EMS.
- Disease Transmission: Understand the principles of disease transmission prevention in EMS.

EMR CH E04: Communications and Documentation

EMR CH E04: Communications and Documentation

- Understand the components of the EMS communication system, including base stations, mobile radios, repeaters, and cellular telephones, and know how to use them to communicate effectively during different stages of EMS operations.
- Understand the importance of communication with medical control and receiving facilities, and know how to give accurate verbal reports, use clear text, avoid codes, and maintain professional behavior during radio transmissions.
- Understand the importance of maintaining communication equipment and ensuring that radios are not drifting from their assigned frequency, and know how to use online medical direction and cellular communications effectively.
- Understand the principles of interpersonal communication with patients, including making and keeping eye contact, using simple language, being aware of body language, and using the proper name, and know how to address special communication situations, such as hearing-impaired and non-English speaking populations.

EMR CH E05: Anatomy and Physiology

EMR CH E05: Anatomy and Physiology

- Explain how these variations affect life support chain elements and the delivery of emergency medical care.

- Understand the age-related variations in anatomy and body functions for pediatric and geriatric patients.
- Understand the effects of blood volume, heart effectiveness, vessel size, and acid on cells and organs.
- Explain the issues impacting fundamental elements, such as air composition, airway patency, ventilation mechanics, respiration regulation, and gas transport.
- Understand the fundamental elements of oxygenation, perfusion, glucose, and waste product removal.
- Explain the structure and function of the integumentary, digestive, endocrine, renal, and reproductive systems.
- Describe the structures and function of the circulatory system, including blood components and the nervous system.
- Explain the function of different types of muscles and the respiratory system.
- Describe the skeletal components and joints of the body.
- Identify the anatomical planes and standard anatomic terms used to describe body systems.

EMR CH E06: Pathophysiology & Shock

EMR CH E06: Pathophysiology & Shock

- **Patency of the Airway:** Understand the anatomical considerations and potential obstructions at various levels of the airway, including the nasopharynx, oropharynx, pharynx, larynx, trachea, and bronchi.
- **Composition of Ambient Air:** Describe the various components of ambient air, including oxygen, nitrogen, and carbon dioxide, and understand the significance of the fraction of inspired and delivered oxygen.
- **Respiratory Compromise:** Understand the changes in the structure and function of the thorax, pleural lining, and muscles of ventilation that can cause respiratory compromise, and the effects of inadequate tidal volume and respiratory rate.
- **Blood Pressure:** Understand the role of cardiac output, systemic vascular resistance, and baroreceptors in blood pressure regulation, and the effects of changes in cardiac output and systemic vascular resistance on blood pressure.
- **Alteration of Cell Metabolism:** Understand the difference between aerobic and anaerobic metabolism, the effects of an acidic environment on cell structure and function, and the effects of inadequate perfusion on cell metabolism and function.

- Microcirculation: Understand the influence of local, neural, and hormonal factors on capillary function and blood pressure.
- Perfusion and Shock: Understand the composition of blood, distribution of blood volume, and the role of hydrostatic pressure and plasma oncotic pressure in perfusion, and the factors that can impair cardiac output and cause shock.
- Ventilation/Perfusion (V/Q) Ratio and Mismatch: Understand the relationship between ventilation and perfusion in the lungs and how disturbance in V/Q ratio can cause hypoxemia.
- Alteration in Regulation of Respiration Due to Medical or Traumatic Conditions: Understand the role of chemoreceptors, stretch receptors, and medulla rhythm centers in regulating respiration, and the effects of arterial carbon dioxide and oxygen content on respiration rate and depth.

EMR CH E07: Life Span Development

EMR CH E07: Life Span Development

- Middle Adulthood (41 to 60 Years): Recognize the physiological changes in middle adulthood, including vital signs, cardiovascular health, weight control, and hearing and vision changes, and the psychological challenges of empty nest syndrome and financial burdens.
- Early Adulthood (20 to 40 Years): Identify and understand the physiological and psychological changes in early adulthood, including peak physical conditioning, job stress, and romantic love.
- Adolescence (13 to 18 Years): Recognize the physiological changes in adolescents, including vital signs, growth spurt, endocrine changes, and psychological development, including peer pressure and self-destructive behaviors.
- School-Age Children (6 to 12 Years): Understand the physiological changes in school-age children, including vital signs and tooth replacement, and the development of self-concept and self-esteem.
- Toddler (12 to 36 Months) and Preschool Age (3 to 5): Recognize the physiological and cognitive development of toddlers and preschool-age children, their vital signs, toilet training patterns, and psychosocial behaviors.
- Late Adulthood (61 Years and Older): Understand the physiological changes in late adulthood, including vital signs, cardiovascular and respiratory changes, sensory losses, and endocrine and gastrointestinal changes, and the psychological challenges of declining well-being and financial burdens.

- Infancy (Birth to 1 Year): Identify and understand the vital signs, physiological and immunological development, and psychosocial behaviors of infants during their first year of life.

EMR CH E08: Lifting and Moving Patients

EMR CH E08: Lifting and Moving Patients

- Understand Basic Principles of Lifting and Moving Patients
- Understand Equipment and Tools
- Understand Patient Safety

EMR CH E09: Medication Administration | Narcan

EMR CH E09: Medication Administration | Narcan

- Understand Opioids
- Understand What is Naloxone?
- Understand Role of an EMT
- Understand Guidelines for Administering Naloxone
- Understand Intranasal Naloxone
- Understand Intramuscular Naloxone

EMR CH E11: Airway management

EMR CH E11: Airway management

- Describe the pulmonary capillary beds and how they function in the exchange of oxygen and carbon dioxide.
- Understand the anatomy of the upper and lower airway tract, including the functions and structures of the nose, mouth, tongue, jaw, pharynx, larynx, epiglottis, vocal cords, thyroid cartilage, cricoid ring, trachea, bronchi, bronchioles, and alveoli.
- Identify the signs of adequate and inadequate airway and their corresponding conditions (e.g., open airway, speaking in full sentences, unusual breathing sounds, tongue or airway obstruction, swelling due to trauma or infection).
- Understand the age-related variations in airway assessment and management for pediatric and geriatric patients.
- Explain the procedures for relief of foreign body airway obstruction and upper airway suctioning.
- Describe the purpose, indications, contraindications, complications, and procedures of nasopharyngeal airway maneuvers.

- Explain the techniques used to assure a patent airway, including manual airway maneuvers and mechanical airway devices.

EMR CH E17: Psychiatric and Behavioral Emergencies

EMR CH E17: Psychiatric and Behavioral Emergencies

- Define and differentiate between behavior, psychiatric disorder, and behavioral emergency.
- Identify the epidemiology of psychiatric disorders and the importance of assessing general appearance, speech, skin, posture/gait, mental status, mood, thought, perception, judgment, memory, and attention.
- Understand the factors that may alter a patient's behavior and the common causes of behavioral alteration, including low blood sugar, lack of oxygen, hypoperfusion, head trauma, mind-altering substances, and withdrawal of drugs or alcohol.
- Understand the types of restraints and transport against the patient's will, as well as age-related variations in pediatric and geriatric assessment and management, including the risks of teenage suicide, aggressive behavior as a symptom of an underlying disorder or disability, and suicide issues/depression in geriatric patients.
- Recognize the signs and symptoms of acute psychosis, depression, and suicide risk, including ideation or defined lethal plan of action which has been verbalized and/or written, alcohol and substance abuse, purposelessness, anxiety, agitation, withdrawal from friends and family, and dramatic mood changes.
- Identify important questions and interventions for managing psychiatric emergencies, including agitated delirium, patient assessment, calming techniques, and transport considerations.

EMR CH E19: Trauma

EMR CH E19: Trauma

- Identify and categorize trauma patients based on the National Trauma Triage Protocol and the Centers for Disease Control and Prevention's guidelines for field triage of injured patients.
- Understand the pathophysiology of blunt and penetrating trauma, including high, medium, and low velocity penetrating trauma.
- Conduct a thorough assessment of the trauma patient, including standard precautions, scene size-up, primary and secondary assessments, and reassessment, while considering mechanisms of injury, baseline vital signs, and history.

- Perform a primary survey to assess airway, breathing, circulation, and disability, and provide appropriate interventions as needed.
- Conduct a secondary assessment, including a head-to-toe physical exam and trauma scoring, to identify potential injuries and provide appropriate interventions.
- Manage the trauma patient by providing rapid transport, selecting appropriate destinations based on trauma system components and hospital categorizations, and considering transport considerations such as scene time and air versus ground transport.

EMR CH E22: Head, Facial, Neck, and Spine Trauma

EMR CH E22: Head, Facial, Neck, and Spine Trauma

- Understand the incidence, mechanisms, and associated injuries of head, face, and neck injuries from various causes.
- Identify and assess injuries to the scalp, face, eyes, nose, mouth, throat, and neck, including airway compromise and cervical spine injury.
- Understand age-related variations in head, face, and neck injuries, including modifications for pediatric and geriatric patients.
- Differentiate between types of intracranial hematoma and concussion, and manage accordingly.
- Manage and stabilize injuries to the head, face, and neck, including bleeding control, airway management, immobilization, and transport considerations.
- Recognize signs and symptoms of brain injury, including increased intracranial pressure, and implement appropriate management.

EMR CH E23: Environmental Emergencies

EMR CH E23: Environmental Emergencies

- Understand the mechanism of injury, signs and symptoms, and appropriate management for dysbarism in SCUBA divers.
- Bites and envenomations: Identify and manage bites and envenomations from spiders, snakes, and insects, including anaphylactic reactions.
- Recognize and treat cold- and heat-related illnesses, such as hypothermia, frostbite, heat stroke, and dehydration.
- Learn to assess and manage patients who suffer from drowning or submersion incidents, including hypoxia, cold water submersion, and spinal trauma.
- Understand the effects of radiation exposure and appropriate management strategies.

- Know how to assess and manage patients with electrical injuries, including recognizing the risk of cardiac arrest.
- Recognize the unique assessment and management considerations for pediatric and geriatric patients.

EMR CH E27: Geriatrics

EMR CH E27: Geriatrics

- Identify toxicological emergencies in elderly patients and understand the pathophysiological changes that make them more susceptible to toxicity, such as decreased kidney function and altered gastrointestinal absorption.
- Identify anatomical and physiological changes in the cardiovascular system of elderly patients, including degeneration of valves, conduction system, and muscular changes.
- Treat cardiovascular conditions in elderly patients with appropriate airway, ventilatory, and circulatory support and oxygen adjuncts, and evaluate patient treatment through reassessment.
- Recognize signs and symptoms of myocardial infarction, dysrhythmias, and chest pain in elderly patients, as well as changes in physical assessment, circulation, and breath sounds.
- Assess respiratory changes in elderly patients, including loss of elastic recoil and alveoli, decreased cough reflex, and pneumonia caused by bacterial, viral, or fungal infection.
- Recognize associated signs and symptoms of respiratory conditions in elderly patients, such as exertional dyspnea, productive cough, wheezing, and headache.
- Evaluate respiratory pathophysiology in elderly patients through history, risk factors, and current medications, and provide appropriate airway, ventilatory, and circulatory support and oxygen adjuncts.
- Identify signs and symptoms of delirium, including disorganized thoughts, hallucinations, and reduced level of consciousness, and evaluate pathophysiology through history, risk factors, and current medications.
- Assess and treat gastrointestinal bleeding caused by disease processes, inflammation, infection, and obstruction of the upper and lower gastrointestinal tract, using appropriate airway, ventilatory, and circulatory support and oxygen adjuncts.
- Recognize musculoskeletal changes in elderly patients, including atrophy of muscles and muscle wasting, degenerative changes and loss of bone, degenerative changes in joints, and thinning of cartilage and thickening of synovial fluid.

- Assess sensory changes in elderly patients, including decreased visual acuity, inability to differentiate colors, decreased night vision, decreased tear production, and presbycusis, and understand disease processes such as glaucoma and macular degeneration.

EMR CH E28: Patients with Special Challenges

EMR CH E28: Patients with Special Challenges

- Recognize the increased risk for diabetes, hypertension, heart disease, and stroke, and develop patient handling strategies to prevent back injuries and position the patient to breathe.
- Understand the different types of technology-assisted/dependent devices, such as ventilation devices, apnea monitoring/pulse oximetry, long-term vascular access devices, dialysis shunts, nutritional support, and colostomy or ileostomy.
- Respect the patient and their family or friends, provide explanations, and be prepared to receive additional information from them.
- Understand the basics of hospice care, including comfort care versus curative care, EMS intervention, and DNR (Do Not Resuscitate) orders.
- Understand the different components of tracheostomy, routine care principles, and acute care considerations.
- Develop strategies for communicating with patients who have sensory deficits, such as sight or hearing impairment, and recognize the use of service dogs or sign language interpreters.
- Understand the common reasons for calls from patients over age 65 who receive homecare.
- Advocate for patient rights and appropriate care, identify facilities that treat regardless of payment, be familiar with community assistance resources, and recognize the increased probability of disease.
- Understand the different types of child and elder abuse and neglect, assessment and management principles, and legal and documentation aspects.

EMR CH E29: Transport Operations

EMR CH E29: Transport Operations

- Understand Causes of Ambulance Crashes
- Understand Particular types of transport
- Understand Dealing with an Air Ambulance emergency

- Understand The nine phases of an ambulance call

EMR CH E32: Vehicle Extrication

EMR CH E32: Vehicle Extrication

- Understand the role of EMS in vehicle extrication, including providing patient care and performing simple extrication while prioritizing personal safety.
- Develop skills to ensure patient safety during vehicle extrication, such as keeping them informed of actions, protecting from further harm, and controlling traffic flow.
- Understand situational safety considerations, including controlling traffic flow, properly positioning emergency vehicles, and assessing hazards such as downed electrical lines, leaking fuels or fluids, and broken glass.
- Understand special considerations for patient care during vehicle extrication, such as maintaining manual cervical spine stabilization, completing primary assessment, providing critical interventions, and assisting with rapid extrication using the path of least resistance and sufficient personnel.
- Develop skills for extrication using simple hand tools, such as hammers, center punches, pry bars, hack saws, and come-alongs.
- Develop skills for vehicle stabilization, including putting the vehicle in "park" or in gear, setting the parking brake, and identifying hazardous vehicle safety components.
- Evaluate the need for additional resources during vehicle extrication, such as extrication equipment, fire suppression, law enforcement, and utility companies

EMT CH 001: EMS Systems

EMT CH 001: EMS Systems

- System for continually evaluating and improving care: Explain the principles of continuous quality improvement in EMS and the dynamic process of evaluating and improving EMS care.
- Patient safety in EMS: Identify high-risk activities in patient safety in EMS, understand how errors happen and how to prevent them through environmental factors, clear protocols, and reflection in action.
- History and evolution of EMS systems: Understand the factors that led to the creation of modern EMS systems and the principles of resource management, regulations, and policies that govern EMS services.
- EMS licensure, education, and oversight: Identify the different levels of EMS licensure, understand the National EMS Education Agenda for the Future, and explain the role of oversight and clinical protocols in ensuring quality care.

- Roles and responsibilities of EMS personnel: Understand the principles of safety, patient assessment, and emergency care in EMS, as well as the importance of integration with other professionals, administrative support, and professional development.
- Characteristics of professional behavior in EMS: Describe the different characteristics of professional behavior in EMS, their importance in practice, and the principles of patient advocacy, certification, and personal responsibility.

EMT CH 002: The Well-Being of the EMT

EMT CH 002: The Well-Being of the EMT

- Evidence-Based Decision-Making: Understand the importance of using evidence-based decision-making in EMS practice.
- Standard Safety Precautions: Demonstrate adherence to standard safety precautions, including hand washing, environmental control, and safe operation of EMS equipment.
- Wellness Principles: Understand the importance of physical and mental wellbeing in EMS, including physical fitness, sleep, disease prevention, and stress management.
- Disease Transmission: Understand the principles of disease transmission prevention in EMS.
- Medical Restraint: Understand the use of medical restraint and the principles of the Use of Force Doctrine in EMS.
- Patient Positioning: Understand the principles of patient positioning, including different positioning techniques for patients with varying medical conditions.
- Lifting and Moving Patients: Understand the guidelines for lifting and moving patients, including lifting techniques, safety precautions, and the use of equipment such as stretchers and cots.
- Prevention of Work-Related Injuries: Understand how to prevent work-related injuries by practicing safe lifting techniques, maintaining physical fitness and nutrition, and following Standard Precautions/OSHA regulations.
- Stress Management: Understand the different types of stress reactions, and learn stress management techniques such as lifestyle changes and seeking professional assistance.
- Personal Protective Equipment: Understand the importance of personal protective equipment in preventing occupational hazards.

EMT CH 003: Medical Ethics

EMT CH 003: Medical Ethics

- **Ethical Principle/Moral Obligations:** Understand the difference between ethics and morals, the importance of applying ethical values in EMS, and the potential ethical conflicts that may arise in providing care.
- **Mandatory Reporting:** Understand the situations in which mandatory reporting is required, including cases of abuse, neglect, and other forms of misconduct.
- **Statutory Responsibilities:** Understand the legal and statutory responsibilities of EMS personnel, including the need to follow established protocols and guidelines, maintain proper documentation, and comply with reporting requirements.
- **Consent/Refusal of Care:** Understand the different types of consent, legal complications related to consent, and the importance of proper documentation in providing care and ensuring patient safety.
- **Evidence Preservation:** Understand the importance of preserving evidence in EMS, including the different types of evidence that may be relevant in a given situation.
- **Tort and Criminal Actions:** Understand the different types of criminal and civil tort actions in EMS, the concept of negligence and the elements that comprise it, the potential defenses against liability, and the importance of mandatory reporting in certain situations.
- **Advanced Directives:** Understand the Patient Self-Determination Act, the different types of advanced directives, and the importance of respecting patient autonomy and wishes.
- **Confidentiality:** Explain the obligation to protect patient information, the Health Information Portability and Accountability Act (HIPAA), the different types of legally mandated reporting requirements, and the potential consequences of breach of confidentiality.

EMT CH 004: Communications and Documentation

EMT CH 004: Communications and Documentation

- Understand the principles of interpersonal communication with patients, including making and keeping eye contact, using simple language, being aware of body language, and using the proper name, and know how to address special communication situations, such as hearing-impaired and non-English speaking populations.

- Understand the importance of maintaining communication equipment and ensuring that radios are not drifting from their assigned frequency, and know how to use online medical direction and cellular communications effectively.
- Understand the importance of communication with medical control and receiving facilities, and know how to give accurate verbal reports, use clear text, avoid codes, and maintain professional behavior during radio transmissions.
- Understand the components of the EMS communication system, including base stations, mobile radios, repeaters, and cellular telephones, and know how to use them to communicate effectively during different stages of EMS operations.

EMT CH 005: Anatomy and Physiology

EMT CH 005: Anatomy and Physiology

- Identify the anatomical planes and standard anatomic terms used to describe body systems.
- Describe the skeletal components and joints of the body.
- Explain the function of different types of muscles and the respiratory system.
- Describe the structures and function of the circulatory system, including blood components and the nervous system.
- Explain the structure and function of the integumentary, digestive, endocrine, renal, and reproductive systems.
- Understand the fundamental elements of oxygenation, perfusion, glucose, and waste product removal.
- Explain the issues impacting fundamental elements, such as air composition, airway patency, ventilation mechanics, respiration regulation, and gas transport.
- Understand the effects of blood volume, heart effectiveness, vessel size, and acid on cells and organs.
- Understand the age-related variations in anatomy and body functions for pediatric and geriatric patients.
- Explain how these variations affect life support chain elements and the delivery of emergency medical care.

EMT CH 006: Ventilation, Perfusion & and Shock | Understanding Pathophysiology

EMT CH 006: Ventilation, Perfusion & and Shock | Understanding Pathophysiology

- **Alteration in Regulation of Respiration Due to Medical or Traumatic Conditions:** Understand the role of chemoreceptors, stretch receptors, and medulla rhythm centers in regulating respiration, and the effects of arterial carbon dioxide and oxygen content on respiration rate and depth.
- **Patency of the Airway:** Understand the anatomical considerations and potential obstructions at various levels of the airway, including the nasopharynx, oropharynx, pharynx, larynx, trachea, and bronchi.
- **Composition of Ambient Air:** Describe the various components of ambient air, including oxygen, nitrogen, and carbon dioxide, and understand the significance of the fraction of inspired and delivered oxygen.
- **Respiratory Compromise:** Understand the changes in the structure and function of the thorax, pleural lining, and muscles of ventilation that can cause respiratory compromise, and the effects of inadequate tidal volume and respiratory rate.
- **Ventilation/Perfusion (V/Q) Ratio and Mismatch:** Understand the relationship between ventilation and perfusion in the lungs and how disturbance in V/Q ratio can cause hypoxemia.
- **Perfusion and Shock:** Understand the composition of blood, distribution of blood volume, and the role of hydrostatic pressure and plasma oncotic pressure in perfusion, and the factors that can impair cardiac output and cause shock.
- **Microcirculation:** Understand the influence of local, neural, and hormonal factors on capillary function and blood pressure.
- **Blood Pressure:** Understand the role of cardiac output, systemic vascular resistance, and baroreceptors in blood pressure regulation, and the effects of changes in cardiac output and systemic vascular resistance on blood pressure.
- **Alteration of Cell Metabolism:** Understand the difference between aerobic and anaerobic metabolism, the effects of an acidic environment on cell structure and function, and the effects of inadequate perfusion on cell metabolism and function.

EMT CH 007: Life Span Development

EMT CH 007: Life Span Development

- Toddler (12 to 36 Months) and Preschool Age (3 to 5): Recognize the physiological and cognitive development of toddlers and preschool-age children, their vital signs, toilet training patterns, and psychosocial behaviors.
- School-Age Children (6 to 12 Years): Understand the physiological changes in school-age children, including vital signs and tooth replacement, and the development of self-concept and self-esteem.
- Adolescence (13 to 18 Years): Recognize the physiological changes in adolescents, including vital signs, growth spurt, endocrine changes, and psychological development, including peer pressure and self-destructive behaviors.
- Early Adulthood (20 to 40 Years): Identify and understand the physiological and psychological changes in early adulthood, including peak physical conditioning, job stress, and romantic love.
- Middle Adulthood (41 to 60 Years): Recognize the physiological changes in middle adulthood, including vital signs, cardiovascular health, weight control, and hearing and vision changes, and the psychological challenges of empty nest syndrome and financial burdens.
- Infancy (Birth to 1 Year): Identify and understand the vital signs, physiological and immunological development, and psychosocial behaviors of infants during their first year of life.
- Late Adulthood (61 Years and Older): Understand the physiological changes in late adulthood, including vital signs, cardiovascular and respiratory changes, sensory losses, and endocrine and gastrointestinal changes, and the psychological challenges of declining well-being and financial burdens.

EMT CH 008: Principles of Pharmacology

EMT CH 008: Principles of Pharmacology

- Medication safety: Understand the importance of medication safety in emergency medicine and the principles of safe medication administration.
- Drug profile: Describe the actions, pharmacodynamics, indications, intended and unintended effects, contraindications, side effects, untoward effects, dose, route, and prescribing information of medications.
- Basic medication terminology: Understand the difference between generic and trade drug names.

- Kinds of medications used in an emergency: Identify the different forms and routes of medication administration, including pills, tablets, inhalation, liquids, enteral and parenteral administration, sublingual, oral, inhaled, and injection methods.

EMT CH 009: Medical Terminology

EMT CH 009: Medical Terminology

- Standard Medical Abbreviations and Acronyms: Identify standard medical abbreviations and acronyms used in healthcare settings and understand their meanings.
- Medical Terms Associated with Body Direction or Position: Identify medical terms associated with different body directions and positions including anterior, posterior, medial, and lateral.
- Medical Terms Associated with Body Systems: Identify medical terms associated with different body systems including the cardiovascular, respiratory, digestive, and nervous systems.
- Medical Terms Associated with Body Structure: Identify medical terms associated with different parts of the body including bones, muscles, organs, and tissues.
- Medical Terminology: Understand the different types of medical terminology including prefixes, root words, suffixes, and combining forms.

EMT CH 011: Airway management

EMT CH 011: Airway management

- Understand the anatomy of the upper and lower airway tract, including the functions and structures of the nose, mouth, tongue, jaw, pharynx, larynx, epiglottis, vocal cords, thyroid cartilage, cricoid ring, trachea, bronchi, bronchioles, and alveoli.
- Describe the pulmonary capillary beds and how they function in the exchange of oxygen and carbon dioxide.
- Identify the signs of adequate and inadequate airway and their corresponding conditions (e.g., open airway, speaking in full sentences, unusual breathing sounds, tongue or airway obstruction, swelling due to trauma or infection).
- Describe the purpose, indications, contraindications, complications, and procedures of nasopharyngeal airway maneuvers.
- Explain the procedures for relief of foreign body airway obstruction and upper airway suctioning.
- Explain the techniques used to assure a patent airway, including manual airway maneuvers and mechanical airway devices.

- Understand the age-related variations in airway assessment and management for pediatric and geriatric patients.

EMT CH 013: LVAD

EMT CH 013: LVAD

- Understand LVAD Functionality
- Understand Status, Alarms, Actions
- Understand LVAD Patient Assessment
- Understand Controls for Different LVADs
- Understand Left Ventricular Assist Devices | History & Overview

EMT CH 014: Patient Assessment

EMT CH 014: Patient Assessment

- Quickly identify and protect oneself from violent or hazardous situations
- Size-up the scene and determine if additional or specialized resources are required
- Assess the patient to understand the problem, so appropriate care can be given

EMT CH 016: Gastrointestinal and Urologic Emergencies

EMT CH 016: Gastrointestinal and Urologic Emergencies

- Define acute abdomen and identify the anatomy of the organs of the abdominopelvic cavity, including the stomach, intestines, esophagus, spleen, urinary bladder, liver, gall bladder, pancreas, kidney, and reproductive organs.
- Explain the general management for patients with an acute abdomen, including scene safety and standard precautions, airway, ventilatory, and circulation support, positioning, and emotional support.
- Describe the assessment techniques and symptoms of an acute abdomen, including inspection, palpation, normal and abnormal findings (e.g., nausea/vomiting, change in bowel habits, pain, tenderness, guarding, distension), and other related symptoms (e.g., dark tarry stool, belching/flatulence, concurrent chest pain, urination).
- Identify appropriate transport decisions for patients with an acute abdomen, taking into account factors like the severity of the condition, the availability of specialized medical care, and the potential risks and benefits of different transport options.
- Explain the importance of communication and documentation for patients with an abdominal or gastrointestinal condition or emergency, including the use of appropriate

medical terminology, accurate and timely reporting of assessment findings and symptoms, and proper documentation of interventions and treatments.

- Consider age-related variations for pediatric and geriatric assessment and management, including the anatomic and physiologic differences in children, pathophysiology, assessment, physical findings, and management strategies for conditions like vomiting, GI bleeding, and appendicitis.
- Describe specific acute abdominal conditions, their causes, assessment findings and symptoms, complications, and specific prehospital management, such as acute and chronic gastrointestinal hemorrhage, peritonitis, and ulcerative diseases.

EMT CH 017: Neurologic Emergencies

EMT CH 017: Neurologic Emergencies

- Explain the importance of rapid transport to appropriate facilities for patients with stroke/TIA, seizures, altered mental status, and other conditions that require urgent medical attention.
- Understand the causes of stroke/TIA, including hemorrhage and clot, and review the anatomy and function of the brain and cerebral blood vessels.
- Identify the assessment findings and symptoms of stroke/TIA, such as confusion, weakness, facial drooping, difficulty speaking, and headache, and explain the Stroke Alert Criteria and Cincinnati Prehospital Stroke Scale used to diagnose it.
- Describe the incidence and causes of seizures, and identify the different types of seizures, including generalized tonic-clonic, tonic, clonic, and partial seizures.
- Explain the management of patients with stroke/TIA, including ensuring scene safety and standard precautions, assessing ABCs/position, providing oxygen/suction, offering emotional support, and arranging for rapid transport.
- Understand the importance of communication and documentation in EMS care, including effective communication with patients, families, and other healthcare providers, and accurate and complete documentation of assessment findings, interventions, and transport decisions.
- Explain the age-related variations in pediatric and geriatric assessment and management, including the epidemiology, anatomic and physiologic differences, causes of altered mental status, and management strategies for stroke/TIA, seizures, and altered mental status in children and stroke in older adults.
- Understand the causes and assessment findings and symptoms of headache, both as a symptom and as a neurological condition, and describe its management.

- Identify the assessment findings and symptoms of seizures, such as spasms, muscle contractions, and incontinence, and explain the management of seizures, including ensuring safety/positioning, assessing ABCs, providing oxygen/suction, and offering emotional support.

EMT CH 018: Respiratory Emergencies

EMT CH 018: Respiratory Emergencies

- Understand the transport decisions involved in respiratory emergencies.
- Understand the EMT role in assisting with the administration of metered-dose inhalers and small volume nebulizers, including indication/contraindications, actions, side effects, dose and route, and medical control role.
- Consider age-related variations in pediatric and geriatric assessment and management, including upper and lower airway obstruction, pneumonia, chronic conditions such as COPD, croup, foreign body aspiration, epiglottitis, asthma, bronchiolitis, pertussis, and cystic fibrosis.
- Describe the importance of effective communication and documentation for patients with respiratory emergencies.
- Identify and describe the causes, assessment findings and symptoms, complications, and prehospital management of specific respiratory conditions, such as asthma, pulmonary edema, chronic obstructive pulmonary disease, pneumonia, spontaneous pneumothorax, pulmonary embolism, epiglottis, pertussis, cystic fibrosis, and viral respiratory infections.
- Explain the prehospital management of respiratory distress, including scene safety and standard precautions, ABCs, positioning, oxygen/suction, pulse oximetry, emotional support, and transport.
- Understand the normal respiratory effort and the assessment findings and symptoms of respiratory distress, including shortness of breath, restlessness, changes in respiratory rate or rhythm, skin color changes, abnormal sounds of breathing/lung sounds, inability to speak, retractions, altered mental status, abdominal breathing, coughing, and the tripod position.
- Identify the anatomy of the respiratory system, including the upper and lower airway, lungs, and accessory structures.

EMT CH 019: Cardiac Emergencies

EMT CH 019: Cardiac Emergencies

- Identify the pharmacological agents used in cardiac emergencies, including aspirin and nitroglycerin, and understand their indications, contraindications, actions, side effects, precautions, dosage, administration, and documentation.
- Understand the pathophysiology of cardiac compromise, atherosclerosis, rate-related compromise, and assessment of primary and secondary surveys, and evaluation of management of cardiac emergencies.
- Understand the physiology of the cardiovascular system, including the cardiac cycle, blood circulation through a double pump, oxygenation of tissues, delivery of oxygenated blood, and removal of tissue wastes.
- Identify the anatomy of the cardiovascular system, including the heart chambers, valves, blood supply to myocardium, specialized electrical cells, automaticity, autonomic system control, vessels, blood components, and pulse.
- Recognize age-related variations in cardiac emergencies for pediatric and geriatric patients, including cardiac problems associated with congenital heart condition, cardiovascular compromise caused by respiratory compromise, and typical MI presentations related to other underlying disease processes such as diabetes, asthma, and COPD.

EMT CH 020: Diabetic and Endocrine Emergencies

EMT CH 020: Diabetic and Endocrine Emergencies

- Describe the general assessment findings and symptoms of diabetes, including confusion, vertigo, headache, syncope, decreasing or increasing levels of consciousness, visual changes, speech changes, and movement and sensation changes.
- Identify the definition of terms related to diabetes, including types I and II, hypoglycemia, hyperglycemia, diabetic ketosis, and anatomy and function of the pancreas.
- Explain the transport decisions related to rapid transport for altered level of consciousness in diabetes management.
- Describe the communication and documentation protocols related to diabetes management.

- Explain the indication, contraindications, actions, side effects, dose and route, and medical control role of oral glucose, and considerations for age-related variations in pediatric and geriatric assessment and management.
- Identify the causes, history, and assessment findings of hypoglycemia, including onset, bizarre behavior, tremors, shaking, sweating, hunger, and management.
- Describe the pathophysiology, causes, history, and assessment findings of hyperglycemia/diabetic ketoacidosis, including onset, Kussmaul's breathing, acetone breath, dehydration, weakness, nausea, vomiting, polyuria, polydipsia, polyphagia, and management.

EMT CH 021: Allergic Reaction

EMT CH 021: Allergic Reaction

- Define acute abdomen and identify common causes.
- Identify assessment findings for allergic reactions and anaphylaxis, including respiratory, cardiovascular, skin, and other symptoms.
- Describe the fundamental pathophysiology of allergic reactions, including increased capillary permeability, vasodilation, bronchoconstriction, and increased mucus production.
- Describe the importance of effective communication and documentation in transport decisions for patients with allergic reactions.
- Identify indications, contraindications, actions, and side effects of epinephrine as a treatment for allergic reactions.
- Describe the management of allergic reactions and anaphylaxis, including the ABCs, positioning, oxygen therapy, emotional support, assisting with autoinjectors, removing allergens, and administering epinephrine.
- Explain age-related variations in pediatric and geriatric assessment and management of allergic reactions.

EMT CH 022: Environmental Injuries

EMT CH 022: Environmental Injuries

- Learn to assess and manage patients who suffer from drowning or submersion incidents, including hypoxia, cold water submersion, and spinal trauma.
- Recognize and treat cold- and heat-related illnesses, such as hypothermia, frostbite, heat stroke, and dehydration.

- Bites and envenomations: Identify and manage bites and envenomations from spiders, snakes, and insects, including anaphylactic reactions.
- Understand the mechanism of injury, signs and symptoms, and appropriate management for dysbarism in SCUBA divers.
- Know how to assess and manage patients with electrical injuries, including recognizing the risk of cardiac arrest.
- Understand the effects of radiation exposure and appropriate management strategies.
- Recognize the unique assessment and management considerations for pediatric and geriatric patients.

EMT CH 023: Poisoning and Overdose Emergencies | Toxicology

EMT CH 023: Poisoning and Overdose Emergencies | Toxicology

- Define toxicology, poisoning, and overdose and identify the National Poison Control Center and the routes of absorption (ingestion, inhalation, injection, and absorption).
- Identify examples, assessment findings, and general management considerations for poisoning by ingestion, inhalation, injection, and absorption.
- Identify common causative agents, assessment findings, symptoms, and management for opiates/narcotics, alcohol, cannabis, hallucinogens, stimulants, barbiturates/sedatives/hypnotics, pesticides, chemicals, household cleaning poisonings, and poisonous plants.
- Identify common causes of medication overdose (other than drugs of abuse), assessment findings, and symptoms for patients with medication overdose, and management for a patient with medication overdose.
- Explain the general treatment modalities for poisonings, including scene safety, standard precautions, decontamination, airway control, ventilation and oxygenation, circulation, and the use of activated charcoal.
- Consider age-related variations for pediatric and geriatric assessment and management.
- Explain communication and documentation for patients with toxicological emergencies.
- Identify the factors involved in transport decisions for patients with toxicological emergencies.

EMT CH 024: Multi-System Trauma

EMT CH 024: Multi-System Trauma

- Understand the definition of kinematics and how it can be used to predict injuries based on an evaluation of motion involved in trauma.
- Recognize the different types of blunt trauma and how they can cause collisions of objects or organs within the body, including deceleration injuries and penetrating trauma.
- Identify the impact of the direction and energy of force on the type of injury sustained in trauma, including low, medium, and high-energy injuries.
- Understand the signs and symptoms of multi-system trauma, which can affect more than one major system or organ and require a team of physicians for treatment.
- Follow the Golden Principles of Out-of-Hospital Trauma Care, which include safety of rescue personnel and patient, determination of additional resources, identification and management of life threats, and maintenance of normal body temperature.
- Recognize the importance of airway, ventilation, and oxygenation in multi-system trauma care, as well as the need to control arterial bleeding and use appropriate transport considerations.
- Understand the specific injuries related to multi-system trauma, such as blast injuries caused by different types of blast waves and ground shock, and their management considerations.

EMT CH 025: Hematologic Emergencies

EMT CH 025: Hematologic Emergencies

- General assessment: Evaluate the patient's level of consciousness, skin, visual disturbances, gastrointestinal symptoms, skeletal symptoms, cardiorespiratory symptoms, and genitourinary symptoms.
- General management: Manage the patient's airway, ventilation, and circulation, administer oxygen, consider transport considerations, and use psychological and communication strategies
- Anatomy and physiology: Understand the components of blood, including red blood cells, white blood cells, platelets, and plasma, and the processes of red cell production and destruction.
- Pathophysiology of sickle cell: Understand the mechanisms and symptoms of sickle cell crisis.

- Clotting disorders: Consider age-related variations in clotting disorders, including pediatrics and geriatrics.

EMT CH 026: Behavioral and Psychiatric Emergencies and Suicide

EMT CH 026: Behavioral and Psychiatric Emergencies and Suicide

- Understand the types of restraints and transport against the patient's will, as well as age-related variations in pediatric and geriatric assessment and management, including the risks of teenage suicide, aggressive behavior as a symptom of an underlying disorder or disability, and suicide issues/depression in geriatric patients.
- Identify important questions and interventions for managing psychiatric emergencies, including agitated delirium, patient assessment, calming techniques, and transport considerations.
- Recognize the signs and symptoms of acute psychosis, depression, and suicide risk, including ideation or defined lethal plan of action which has been verbalized and/or written, alcohol and substance abuse, purposelessness, anxiety, agitation, withdrawal from friends and family, and dramatic mood changes.
- Define and differentiate between behavior, psychiatric disorder, and behavioral emergency.
- Understand the factors that may alter a patient's behavior and the common causes of behavioral alteration, including low blood sugar, lack of oxygen, hypoperfusion, head trauma, mind-altering substances, and withdrawal of drugs or alcohol.
- Identify the epidemiology of psychiatric disorders and the importance of assessing general appearance, speech, skin, posture/gait, mental status, mood, thought, perception, judgment, memory, and attention.

EMT CH 027: Obstetric and Gynecologic Emergencies

EMT CH 027: Obstetric and Gynecologic Emergencies

- Understand the anatomy and physiology of the female productive system
- Understand how pregnancy affects the female physiology and anatomy
- Recognize a pregnancy emergency and be able to manage the evolving conditions
- Care for a neonate including resuscitation
- Manage the mother post-delivery
- Understand pre-labor pregnancy emergencies
- Have a basic overview of non-pregnancy related gynecological emergencies

EMT CH 028: Pediatric Emergencies

EMT CH 028: Pediatric Emergencies

- Understand the differences in anatomy and physiology between pediatric and adult patients, including the size and structure of the head, airway, chest and lungs, abdomen, and extremities.
- Recognize the implications for healthcare providers in caring for pediatric patients, such as the increased risk of blunt head trauma, difficulty securing the airway, and vulnerability to internal injuries.
- Develop skills to assess and manage pediatric patients with consideration for their unique anatomy and physiology, including effective diaphragmatic excursion, careful monitoring of internal organs, and minimizing the risk of injury to growth plates.
- Describe the integumentary differences in pediatric patients, including larger surface area, increased susceptibility to burns, and risk of hypothermia.
- Identify the respiratory system differences in pediatric patients, such as higher oxygen demand and smaller lung reserves, and their implications for healthcare providers.
- Explain the nervous system and spinal column differences in pediatric patients, including fragile brain tissue, a small subarachnoid space, and the risk of hypoxia and hypotension in head injury cases.
- Discuss the metabolic differences in pediatric patients, including limited glucose stores and increased susceptibility to hypothermia in newborns and infants.
- Identify the physical, cognitive, and emotional development milestones of pediatric patients in different age ranges, and their implications for healthcare providers in terms of potential health issues and appropriate communication and treatment strategies.
- Understand the physical, cognitive, and emotional development during adolescence and the implications for healthcare providers.
- Recognize and manage respiratory distress, upper and lower airway obstruction, shock, altered mental status, seizures, closed head injury, vomiting, diarrhea, and toxicology in pediatric patients.
- Identify the risk factors and assessment criteria for sudden infant death syndrome (SIDS) and provide appropriate management.
- Respond to pediatric trauma by performing a focused history and physical exam, identifying life-threatening injuries, and providing appropriate care.

EMT CH 029: Geriatric Emergencies

EMT CH 029: Geriatric Emergencies

- Identify signs and symptoms of delirium, including disorganized thoughts, hallucinations, and reduced level of consciousness, and evaluate pathophysiology through history, risk factors, and current medications.
- Assess sensory changes in elderly patients, including decreased visual acuity, inability to differentiate colors, decreased night vision, decreased tear production, and presbycusis, and understand disease processes such as glaucoma and macular degeneration.
- Identify toxicological emergencies in elderly patients and understand the pathophysiological changes that make them more susceptible to toxicity, such as decreased kidney function and altered gastrointestinal absorption.
- Recognize musculoskeletal changes in elderly patients, including atrophy of muscles and muscle wasting, degenerative changes and loss of bone, degenerative changes in joints, and thinning of cartilage and thickening of synovial fluid.
- Assess and treat gastrointestinal bleeding caused by disease processes, inflammation, infection, and obstruction of the upper and lower gastrointestinal tract, using appropriate airway, ventilatory, and circulatory support and oxygen adjuncts.
- Recognize associated signs and symptoms of respiratory conditions in elderly patients, such as exertional dyspnea, productive cough, wheezing, and headache.
- Evaluate respiratory pathophysiology in elderly patients through history, risk factors, and current medications, and provide appropriate airway, ventilatory, and circulatory support and oxygen adjuncts.
- Identify anatomical and physiological changes in the cardiovascular system of elderly patients, including degeneration of valves, conduction system, and muscular changes.
- Recognize signs and symptoms of myocardial infarction, dysrhythmias, and chest pain in elderly patients, as well as changes in physical assessment, circulation, and breath sounds.
- Treat cardiovascular conditions in elderly patients with appropriate airway, ventilatory, and circulatory support and oxygen adjuncts, and evaluate patient treatment through reassessment.
- Assess respiratory changes in elderly patients, including loss of elastic recoil and alveoli, decreased cough reflex, and pneumonia caused by bacterial, viral, or fungal infection.

EMT CH 030: Emergencies for Patients with Special Challenges

EMT CH 030: Emergencies for Patients with Special Challenges

- Respect the patient and their family or friends, provide explanations, and be prepared to receive additional information from them.
- Understand the basics of hospice care, including comfort care versus curative care, EMS intervention, and DNR (Do Not Resuscitate) orders.
- Understand the common reasons for calls from patients over age 65 who receive homecare.
- Develop strategies for communicating with patients who have sensory deficits, such as sight or hearing impairment, and recognize the use of service dogs or sign language interpreters.
- Understand the different components of tracheostomy, routine care principles, and acute care considerations.
- Understand the different types of technology-assisted/dependent devices, such as ventilation devices, apnea monitoring/pulse oximetry, long-term vascular access devices, dialysis shunts, nutritional support, and colostomy or ileostomy.
- Advocate for patient rights and appropriate care, identify facilities that treat regardless of payment, be familiar with community assistance resources, and recognize the increased probability of disease.
- Understand the different types of child and elder abuse and neglect, assessment and management principles, and legal and documentation aspects.
- Recognize the increased risk for diabetes, hypertension, heart disease, and stroke, and develop patient handling strategies to prevent back injuries and position the patient to breathe.

EMT CH 031: Bleeding and Shock

EMT CH 031: Bleeding and Shock

- Identify the different types of traumatic bleeding (internal, external, arterial, venous, capillary) and their characteristics, severity factors, and physiological responses.
- Describe the general assessment process for patients with traumatic bleeding, including the mechanism of injury, primary survey, mental and physical exams, vital sign variations, pediatric and geriatric considerations, and pre-existing illnesses.
- Explain the management strategies for patients with traumatic bleeding, including body substance isolation, airway patency, oxygenation and ventilation, pulse oximetry,

internal and external bleeding control (e.g., direct pressure, splints, tourniquets), stabilizing body temperature, psychological support, and transport considerations.

- Understand the signs and symptoms of internal bleeding, its definition and description, and the importance of proper assessment and treatment to prevent severe and life-threatening consequences.
- Identify the different transport options for patients with traumatic bleeding, including trauma centers, aeromedical transport, and ALS mutual aid.

EMT CH 032: Trauma to the Head, Neck and Spine

EMT CH 032: Trauma to the Head, Neck and Spine

- Differentiate between types of intracranial hematoma and concussion, and manage accordingly.
- Recognize signs and symptoms of brain injury, including increased intracranial pressure, and implement appropriate management.
- Understand age-related variations in head, face, and neck injuries, including modifications for pediatric and geriatric patients.
- Manage and stabilize injuries to the head, face, and neck, including bleeding control, airway management, immobilization, and transport considerations.
- Identify and assess injuries to the scalp, face, eyes, nose, mouth, throat, and neck, including airway compromise and cervical spine injury.
- Understand the incidence, mechanisms, and associated injuries of head, face, and neck injuries from various causes.

EMT CH 033: Soft-Tissue Injuries

EMT CH 033: Soft-Tissue Injuries

- Understand specific management considerations for different types of burn injuries and age-related variations, such as pediatric and geriatric considerations.
- Learn about the incidence, mortality, and morbidity of soft tissue injuries and burn injuries.
- Understand the anatomy and physiology of soft tissue injuries, including layers of the skin, function of the skin, and types of soft tissue injuries such as contusions, hematomas, and crush injuries.
- Recognize the signs and symptoms of open and closed soft tissue injuries and learn how to assess and manage them, including preventing infection, controlling hemorrhage, and preventing shock.

- Identify different types of burns, such as thermal, inhalation, chemical, electrical, and radiation burns, and understand the severity and depth classifications of burns, body surface area affected, and complications of burn injuries.
- Develop knowledge on general assessment and management of soft tissue and burn injuries, including airway management, respiratory distress, dressing and bandaging, and transportation to an appropriate facility.

EMT CH 034: Face and Neck Injuries

EMT CH 034: Face and Neck Injuries

- Understand anatomy of the Head, Face, and Neck
- Understand General Patient Assessment
- Understand Specific Injuries to Face and Neck
- Understand Age-Related Variations

EMT CH 035: Chest Injuries

EMT CH 035: Chest Injuries

- Understand the incidence and consequences of chest trauma, including morbidity and mortality rates.
- Identify the mechanisms of injury for chest trauma, including blunt and penetrating trauma and energy-related injuries.
- Describe the anatomy of the chest, including the skin, muscles, bones, trachea, bronchi, lungs, vessels, heart, esophagus, and mediastinum.
- Explain the role of the chest in systemic oxygenation, including the musculoskeletal structure, intercostal muscle, diaphragm, accessory muscle, and changes in intrathoracic pressure.
- Understand the principles of ventilation, including gas exchange, minute volume, and normal chest wall movement.
- Describe the pathophysiology of chest trauma, including impaired cardiac output, impaired ventilation, and impaired gas exchange.
- Identify the general assessment findings for chest trauma, including vital signs, medical history, physical exam, and associated injuries.
- Understand the general management principles for chest trauma, including airway and ventilation management and circulation support.
- Describe the specific features and management of blunt trauma or closed chest injury, including rib fractures, flail segment, sternal fracture, and commotio cordis.

- Identify the mechanism of injury and specific injuries associated with open chest injury, including lung injury, myocardial injury, and hemothorax, and understand the signs, symptoms, and management for each.
- Understand the age-related variations in pediatric and geriatric assessment and management for chest trauma.

EMT CH 036: Abdominal and Genitourinary Injuries

EMT CH 036: Abdominal and Genitourinary Injuries

- Identify the anatomy and physiology of the abdomen, including its quadrants and boundaries, surface anatomy, and various organs and structures.
- Identify the special considerations in cases of abdominal trauma, including sexual assault, patient confidentiality, and vaginal bleeding due to trauma.
- Identify the age-related variations for pediatric and geriatric assessment and management of abdominal trauma.
- Describe the general assessment and management of abdominal trauma, including a high index of suspicion, assessment of external and internal hemorrhage, identification and management of life threats, physical exam, recognition and prevention of shock, use of PASG for pelvic fracture stabilization, transportation decisions, and communication and documentation considerations.
- Define the different types of injuries in abdominal trauma, including closed and penetrating trauma, their mechanisms of injury, signs and symptoms, and considerations.
- Describe the incidence, morbidity, and mortality of abdominal trauma, including its contributing factors.

EMT CH 037: Orthopaedic Injuries

EMT CH 037: Orthopaedic Injuries

- Recognize age-related variations in pediatric and geriatric assessment and management of musculoskeletal injuries.
- Understand the different types of splints used for musculoskeletal injuries, including rigid, formable, traction, air, vacuum, pillow/blanket, short spine board, and long spine board.
- Develop skills to assess and manage musculoskeletal injuries, including principles of scene safety, splinting, neurologic and circulatory examination, pain management, immobilization, transportation, communication, and documentation.

- Understand the different complications that can arise from musculoskeletal injuries, such as hemorrhage, instability, loss of tissue, contamination, long-term disability, interruption of blood supply, and pregnancy with pelvic fracture.
- Identify the different types of musculoskeletal injuries and their incidence, including upper and lower extremity injuries, pediatric and geriatric considerations, and mechanisms of injury.
- Understand the anatomy and physiology of the musculoskeletal system, including the function of support, ligaments, tendons, cartilage, joints, flexion, extension, and rotation.

EMT CH 038: Lifting and Moving Patients

EMT CH 038: Lifting and Moving Patients

- Understand Patient Safety
- Understand Basic Principles of Lifting and Moving Patients
- Understand Equipment and Tools

EMT CH 039: EMS Transport Operations

EMT CH 039: EMS Transport Operations

- Understand Particular types of transport
- Understand Dealing with an Air Ambulance emergency
- Understand The nine phases of an ambulance call
- Understand Causes of Ambulance Crashes

EMT CH 040: Highway Safety and Vehicle Extrication

EMT CH 040: Highway Safety and Vehicle Extrication

- Understand the role of EMS in vehicle extrication, including providing patient care and performing simple extrication while prioritizing personal safety.
- Develop skills to ensure patient safety during vehicle extrication, such as keeping them informed of actions, protecting from further harm, and controlling traffic flow.
- Develop skills for vehicle stabilization, including putting the vehicle in "park" or in gear, setting the parking brake, and identifying hazardous vehicle safety components.
- Understand situational safety considerations, including controlling traffic flow, properly positioning emergency vehicles, and assessing hazards such as downed electrical lines, leaking fuels or fluids, and broken glass.

- Understand special considerations for patient care during vehicle extrication, such as maintaining manual cervical spine stabilization, completing primary assessment, providing critical interventions, and assisting with rapid extrication using the path of least resistance and sufficient personnel.
- Develop skills for extrication using simple hand tools, such as hammers, center punches, pry bars, hack saws, and come-alongs.
- Evaluate the need for additional resources during vehicle extrication, such as extrication equipment, fire suppression, law enforcement, and utility companies

EMT CH 042: Multi-Casualty and Field Triage

EMT CH 042: Multi-Casualty and Field Triage

- Develop an understanding of post-traumatic and cumulative stress and the roles of defusing and debriefing in managing it after an MCI.
- Recognize the importance of ongoing coordination and communication during an MCI, including consideration of specialty patient needs and hospital surge capacity.
- Identify the principles and techniques of triage, including primary and secondary triage, documentation, and patient distribution.
- Understand the concept of Multiple Casualty Incidents (MCI) and their significant demand on resources.

EMT CH 043: Hazmat and Terrorism Emergencies

EMT CH 043: Hazmat and Terrorism Emergencies

- Understand the role of EMS in responding to natural or man-made disasters, including providing patient care and operating in an incident command system.
- Assess and manage personal safety on the scene, including using appropriate personal protective equipment and conducting a scene size-up for time, distance, and shielding
- Recognize the signs and symptoms of biological, nuclear, incendiary, chemical, and explosive substances, and apply the concept of "greater good" to any necessary delays in patient care.
- Evaluate the need for additional resources, implement local multiple-casualty incident protocols as necessary, and operate with an all-hazards safety approach.
- Understand the outward signs and characteristics of terrorist incidents and weapons of mass destruction incidents, and communicate with law enforcement at the scene of an armed attack.

- Initiate or expand an incident command system as needed, use a perimeter to protect rescuers and the public, and develop an escape plan and mobilization point at a terrorist incident.
- Develop skills to care for emergency responders on the scene, including safe use and disposal of auto injector devices after activation.

EMT CH 044: Narcan | Naloxone

EMT CH 044: Narcan | Naloxone

- Understand Opioids
- Understand Guidelines for Administering Naloxone
- Understand What is Naloxone?
- Understand Role of an EMT
- Understand Intramuscular Naloxone
- Understand Intranasal Naloxone

EMT CH 045: Hemorrhage Control

EMT CH 045: Hemorrhage Control

- Understand Introduction to Hemorrhage Control
- Understand Wound Packing
- Understand Pressure Dressing
- Understand Tourniquet Use

EMT CH 048: Infectious Diseases

EMT CH 048: Infectious Diseases

- Understand the causes of infectious diseases, including bacteria, viruses, fungi, protozoa, and helminths (worms).
- Apply principles of body substance isolation, hand washing, personal protective equipment (PPE), and cleaning/disposing of contaminated equipment/supplies, including sharps and ambulance decontamination.
- Consider age-related variations in pediatric and geriatric patients when assessing and managing gastrointestinal conditions or emergencies.
- Demonstrate effective communication and documentation practices for patients with communicable or infectious diseases, including transport decisions with special infection control procedures.

- Understand legal requirements for reporting communicable or infectious diseases/conditions, including exposure of healthcare providers and required reporting to health departments or other healthcare agencies.

EMT CH 049: Research and Evidence Based Guidelines

EMT CH 049: Research and Evidence Based Guidelines

- Understand the traditional basis of medical practice and the importance of high-quality patient care focused on improving patient outcomes.
- Recognize the challenge faced by EMS due to the lack of prehospital research.
- Describe the evidence-based decision-making technique for formulating questions, searching medical literature, appraising evidence, and adopting new therapies based on unique patient needs.

EMT CH 050: EMS Culture of Safety

EMT CH 050: EMS Culture of Safety

- Understand Challenges in the EMT Profession
- Understand What is the EMS Culture of Safety?
- Understand Implementing the Culture of Safety
- Understand Patient Safety Organizations
- Understand Crew Resource Management

EMT CH 101: The History of the EMS System

EMT CH 101: The History of the EMS System

- Understand The Beginning of EMS
- Understand Early Civilian Ambulances
- Understand Rise of Modern EMS
- Understand Current and Future State of EMS

EMT CH 102: We don't do that anymore

EMT CH 102: We don't do that anymore

- Understand State of pre-hospital trauma Care in the 1980s
- Understand Military Anti-Shock Trousers
- Understand Trendelenburg Position
- Understand Nasal Airway Adjuncts
- Understand Patient Extrication with KED

- Understand Backboards
- Understand Fluid Management
- Understand Changes since 2017

EMT CH 103: PTSD - The Trauma of Trauma

EMT CH 103: PTSD - The Trauma of Trauma

- Understand An overview of PTSD and Trauma
- Understand PTSD Signs and Symptoms
- Understand PTSD Awareness
- Understand PTSD Treatment

EMT CH 104: Sports Injuries

EMT CH 104: Sports Injuries

- Understand Head, Neck, and Spine Injuries
- Understand Sprains and Fractures
- Understand Helmet and Equipment Removal
- Understand Environment-based Injuries
- Understand Extraordinary or Rare Injuries
- Understand Handling Conflicts
- Understand Concussions

EMT CH 105: Illicit drugs and Tool kit for First Responders

EMT CH 105: Illicit drugs and Tool kit for First Responders

- Understand The Drug Epidemic
- Understand Safety Precautions for EMTs
- Understand NIOSH Toolkit
- Understand Handling Crimes Related to Illicit Drugs

EMT CH 108: LGBTQIA content

EMT CH 108: LGBTQIA content

- Understand What is L-G-B-T-Q-I-A+
- Understand Lesbians and Gays
- Understand Who are Bisexuals and Transgenders?
- Understand What does "Q" stand for
- Understand Other Known Sexualities

- Understand Physical, Mental, And Emotional Health
- Understand Caring for the L-G-B-T-Q-I-A+ Community

OSHA CH 02: Lockout Tagout

OSHA CH 02: Lockout Tagout

- Understand Starting with the Basics
- Understand Employee Training
- Understand Handling Machines
- Understand Lockout Tagout Procedures

OSHA CH 03: Airborne Pathogens

OSHA CH 03: Airborne Pathogens

- Understand What are infectious diseases?
- Understand Specific Airborne Diseases
- Understand Protecting Against Airborne Pathogens

OSHA CH 04: Bloodborne Pathogens

OSHA CH 04: Bloodborne Pathogens

- Understand FAQs on OSHA Standards
- Understand Bloodborne Pathogens and Exposure
- Understand OSHA Standards for Controlling Bloodborne Pathogens

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OSHA CH 01: HazCom

OSHA CH 01: HazCom

- Understand Decontamination
- Understand Training and PPE for EMS Responders
- Understand Implementing Hazzs-Com
- Understand What is Hazzs-Com?

NAHB

Delete

Building Layout

- e. Build better boards and accurately establish building lines with string.

- e. Build better boards and accurately establish building lines with string.
- d. Lay out building lines by using the Pythagorean theorem, and check the layout for accuracy.
- d. Lay out building lines by using the Pythagorean theorem, and check the layout for accuracy.
- c. Use an optical level to determine elevations.
- c. Use an optical level to determine elevations.
- b. Accurately set up and use the builder's level, transit-level, and laser level.
- b. Accurately set up and use the builder's level, transit-level, and laser level.
- a. Establish level points across a building area using a water level and a carpenter's hand spirit level in combination with a straightedge.
- a. Establish level points across a building area using a water level and a carpenter's hand spirit level in combination with a straightedge.

Building Plans and Codes

- a. Describe and explain the function of the various kinds of drawings contained in a set of blueprints.
- b. Demonstrate how specifications are used. I
- c. Identify various types of lines and read dimensions.
- d. Identify and explain the meaning of symbols and abbreviations used on a set of prints.
- e. Read and interpret plot, foundation, floor, and framing plans.
- f. Define and explain the purpose of building codes and zoning laws.
- g. Explain the requirements for obtaining a building permit and the duties of a building inspector.

Concrete Form Construction

- a. Construct forms for footings, slabs, walks, and driveways.
- g. Explain the reasons for reinforcing concrete and describe the materials used.
- h. Estimate quantities of concrete.
- b. Construct concrete forms for foundation walls.
- c. Lay out and build concrete forms for stairs.
- a. Construct forms for footings, slabs, walks, and driveways.
- b. Construct concrete forms for foundation walls.
- h. Estimate quantities of concrete.
- f. Explain the reasons for making a slump test.

- g. Explain the reasons for reinforcing concrete and describe the materials used.
- e. Describe the composition of concrete and factors affecting its strength, durability and workability.
- f. Explain the reasons for making a slump test.
- d. Explain techniques used for the proper placement and curing of concrete.
- e. Describe the composition of concrete and factors affecting its strength, durability and workability.
- c. Lay out and build concrete forms for stairs.
- d. Explain techniques used for the proper placement and curing of concrete.

Fasteners

- Name and describe the following commonly used fasteners and select them for appropriate use: Nails; screws; lag screws; bolts; solid wall anchors; hollow wall anchors; adhesives.

Floor Framing Systems

- a. Describe platform, balloon, and post-and-beam framing, and identify framing members of each.
- b. Describe several energy and material conservation framing methods.
- c. Build and install girders, erect columns, and lay out sills.
- d. Lay out and install floor joints.
- e. Frame openings in floors.
- f. Lie out, cut, and install bridging.
- g. Apply subflooring.
- h. Describe methods to prevent destruction by wood pests.

Hand Power Tools

- b. Describe and safely use the following: circular saws, saber saws, reciprocating saws, drills, hammer-drills, screwdrivers, planes, routers, sanders, staplers, nailers, and power-actuated drivers.
- a. State general safety rules for operating power tools.

Hand Tools

- Identify and describe the hand tools the carpenter commonly uses.
- c. Use hand tools in a safe and appropriate manner
- b. Maintain hand tools in suitable working condition.

Jobsite Safety and Construction Aids

- c. Describe the function of various tools and equipment commonly found on a jobsite.
- d. Describe the safe use of ladders, ladder jacks, and sawhorses.
- b. Identify personal safety devices used in construction.
- a. Describe the characteristics of jobsite safety.
- g. Erect and dismantle metal scaffolding in accordance with recommended, safe procedures.
- f. Identify and describe the safety concerns when using scaffolds.
- e. Identify safety concerns with jobsite electricity.
- h. Follow a recommended procedure to inspect a scaffold for safety.
- j. Construct a scaffold work platform.
- i. Describe the recommended capacities of various parts of a scaffold.
- k. Identify and describe the components of a fall protection system.
- l. Describe the safety concerns when using mobile metal tubular scaffolds.
- o. Build a ladder and sawhorse.
- n. Safely set up, use, and dismantle pump jack scaffolding.
- m. Build safe staging areas using roof brackets.

Roof Framing

- j. Estimate the quantities of materials used in a roof frame.
- a. Describe several roof types.
- i. Apply roof sheathing.
- h. Describe and perform the safe and proper procedure to erect a trussed roof.
- g. Lay out a valley rafter and valley rafters.
- f. Lay out a hip rafter and hip jack rafters.
- e. Lay out and install gable end studs.
- b. Define the various roof framing terms.
- d. Lay out a common rafter and erect a gable roof.
- c. Identify the members of gable, gambrel, hip, intersecting, and shed roofs.

Roofing

- a. Define roofing terms.
- b. Describe and apply roofing felt underlayment, organic or fiberglass asphalt shingles, and roll roofing.
- d. Estimate needed roofing materials.

- c. Describe and apply flashing to valleys, sidewalls, chimneys, and other roof obstructions.

Siding and Decks

- h. Install gutters and downspouts.
- g. Describe various types of cornices and name their parts.
- f. Apply vinyl and aluminum siding.
- e. Apply wood shingles and shakes to sidewalls.
- d. Apply plywood and tapped siding.
- c. Apply horizontal and vertical siding.
- b. Install corner boards and prepare sidewall for siding.
- a. Describe the shapes, sizes, and materials used as siding products.

Stationary Power Tools

- c. Safely operate a table saw, miter saw, band saw, jointer, drill press, shaper, and bench sander.
- b. Describe and adjust a table saw, miter saw, band saw, jointer, drill press, shaper, and bench sander
- a. State general safety rules for operating power tools.

Wall and Ceiling Framing

- a. Identify and describe the function of each part of the wall frame.
- b. Layout and construct a wall.
- c. Describe four different types of walls used in residential framing.
- d. Determine the rough opening width and height for windows and doors.
- e. Lay out the wall plates for partition intersections, openings, and OC studs.
- f. Describe several methods of framing corner and partition intersections.
- g. Assemble and construct a wall section.
- h. Erect and temporarily brace a wall section plumb and straight.
- i. Describe the function of and install blocking and backing.
- j. Apply wall sheathing.
- k. Lay out, cut, and install ceiling joists.
- l. Identify and describe the components of nonstructural steel wall framing.
- m. Install a steel door buck.
- n. Estimate the materials needed for walls and ceiling framing.

Windows & Doors

- b. Select and specify desired sized and styles of windows from manufacturers' catalogs
- a. Describe the most popular styles of windows and name their parts.
- f. Fit and hang a door to a preexisting opening.
- e. Describe the standard designs and sizes of doors and name their parts.
- d. Name the parts of and set a pre-hung door frame.
- c. Install various types of windows in an approved manner.
- h. Install bypass, bi-fold, and pocket doors.
- g. Install locksets in doors.

Wood and Wood Products

- a. Define hardwood and softwood and give examples of some common kinds of species.
- c. Calculate linear foot and compute square foot and board foot measure.
- b. State the grades and sizes of lumber.
- e. Describe the uses and sizes of: laminated veneer lumber, parallel strand lumber, laminated strand lumber, wood I-beams, and glue-laminated beams.
- d. Describe the composition, kinds, sizes and several uses of: plywood, oriented strand board, particleboard, hardboard, medium-density fiberboard, and softboard.

Polestar EL

Learning Modules Badge Stack

Business Ethics

- nan

Business Politics

- nan

priyaCteBadge

priyaCteBadge

priyaCteBadge1

- C1
- C2

Toolwire

Workplace Learning Simulations

Workplace Learning Competency Simulations

- nan

Science, Technology, Engineering & Mathematics (STEM)

Certify ED

Drone (Video & VR)

Drone - Unit 01 - The Evolution and Components of Unmanned Aircraft Systems

- Explain the history of unmanned aircraft systems (UAS).
- Discuss the recent developments in UAS technology.
- Explain the UAS flight as a system of people.
- Identify Fixed wing UAS.
- Identify Rotary wing UAS.

Drone - Unit 02 - Drone Operations: Theory and Practice

- Explain vertical take off and landing (VTOL) UAS.
- Perform preflight inspection procedures.
- Discuss maintenance requirements.
- Discuss emergency procedures in operating an unmanned aircraft.
- Discuss crew risk management.

Drone - Unit 03 - Aerodynamics and Flight Dynamics of Drones

- Identify the aerodynamics of flight.
- Explain the four forces acting during flight.
- Describe the effects of lift on flight.
- Explain unmanned aircraft loading.

Drone - Unit 04 - The Four Forces of Flight: Weight, Thrust, Drag, and Center of Gravity

- Describe the effects of weight on flight.
- Describe effects of thrust on flight.
- Describe the effects of drag on flight.
- Explain the center of gravity and its effects on flight.

Drone - Unit 05 - Visual Line of Sight (VLOS) Operations and Radio Communication

Procedures

- Explain Visual Line of Sight (VLOS) operations.
- Discuss radio and communication procedures for operating a unmanned aircraft.

Drone - Unit 06 - Understanding UAS Regulations and Flight Planning

- Identify regulatory requirements for UAS use.
- Explain personal license requirements.
- Identify what constitutes a small UAS.
- Explain Part 107 waiver.
- Identify flight restrictions around airports.
- Identify visual flight rules (VFR) terms and symbols.
- Explain how to request a NOTAM when flight planning.

Drone - Unit 07 - Navigating the Skies: Understanding and Avoiding Airspace Restrictions

- Explain how to request a Temporary Flight Restriction(TFR).
- Demonstrate how to use a sectional chart for awareness of controlled airspace.
- Demonstrate how to use a sectional chart for awareness of uncontrolled airspace.
- Demonstrate how to use a sectional chart for awareness of other airspace.

Drone - Unit 08 - Weight and Balance and Physiological Factors

- Explain how weight and balance are critical for flight safety.
- Explain the physiological factors affecting pilot performance.

Drone - Unit 09 - Understanding Weather and Its Impact on Drone Flights

- Explain how to request a weather brief when flight planning.
- Interpret weather phenomenon affecting UAS flight.
- Explain how pressure has effects on performance of an unmanned aircraft.
- Explain how temperature change affects lift.
- Explain the effects of wind on an unmanned aircraft.
- Explain the effects of density when flying an unmanned aircraft.
- Explain how thunderstorms work.

Drone - Unit 10 - Drones in Action: Applications Across Industries

- Discuss how UAS is used in Aerial Photography.
- Describe applications for UAS in bridge inspection.
- Describe applications for UAS in search and rescue.

- Identify UAS use in tactical applications.
- Interpret the future of UAS Development.

Drone - Unit Sim

- Learn the basics of successfully flying your drone.
- Learn to operate your drone's onboard camera.
- Practice control and stability as you maneuver through an obstacle course in an urban setting.
- Control and stabilize your drone carrying added weight.
- Search for and identify points of interest (POIs)
- Control and stabilize your drone through varying degrees of extreme atmospheric conditions and ground obstructions that cause wind gusts in varying speed and direction.
- Navigate through hard-to-reach places using your drone's agility.

Fundamentals of Robotics (Video & VR)

Fundamentals of Robotics - Unit 01 - A Comprehensive Overview and Essential Electrical Concepts

- Explore the robotics field and the different industries in which robotics is used.
- Explain some of the main applications for robotics.
- Explain charge.
- Explain voltage.
- Explain current.

Fundamentals of Robotics - Unit 02 - Resistors, Capacitors, Inductors, and Circuit Diagrams

- Explain electrical resistance and identify the function of resistors.
- Explain Ohm's Law and its usefulness.
- Explain electrical capacitance and identify the function of capacitors.
- Explain electrical inductance and identify the function of inductors.
- Explain the basic schematic drawings of electronic circuitry.

Fundamentals of Robotics - Unit 03 - Fundamentals of Electrical Circuits and Motors for Robotics

- Describe how speed, position, and torque are controlled in servo motors.
- Explain series circuits and their uses.

- Explain parallel circuits and their uses.
- Describe the difference between alternating and direct current.
- Describe how a DC motor works and is used.
- Describe how speed, torque, and power are controlled in DC motors.
- Describe how servos are used in robotics to create movement, such as robot arms, legs, steering, et al.

Fundamentals of Robotics - Unit 04 - Breadboarding Fundamentals and Circuit Testing

- Demonstrate how a breadboard works and why it is used.
- Demonstrate basic breadboard construction techniques.
- Explain DC power source and describe its operation.
- Describe a digital multimeter (DMM) and its operation.

Fundamentals of Robotics - Unit 05 - Robotics Hardware: Components, Design, and Sensors

- Explain the use of printed circuit boards and demonstrate how to design their schematics.
- Demonstrate basic soldering techniques.
- Describe magnetics and its use and implications in robotics.
- Explain the basic operation of robot sensors.
- Differentiate between active and passive sensors relative to their use.
- Describe different types of sensors used in robotics and how they work.
- Describe the engineering design process and the activities performed in each step.

Fundamentals of Robotics - Unit 06 - Programming Fundamentals for Robotics

- Explain the writing of code, compiling, levels of programming languages, and types of error.
- Describe fundamental elements of a computer program.
- Explain the importance of a planning a program and programming design review.

Fundamentals of Robotics - Unit 07 - Boolean Logic, Digital Circuits, and Introduction to Programming

- Describe Boolean logic.
- Explain important Boolean laws and logic operators.
- Describe digital logic.
- Define the term algorithm and explain how it relates to problem-solving, design, and data flow.

- Identify programming language design approaches and paradigms.
- Explain different data types and their uses as variables in programming, including naming conventions.

*Fundamentals of Robotics - Unit 08 - Programming Fundamentals for Robotics:
Sequencing, Selection, and Iteration*

- Describe the structure of a simple program, and explain why sequencing is important.
- Describe selection programming structures and explain the logic used for IF statements.
- Describe iterative programming structures and how they are used in programming.

Fundamentals of Robotics - Unit 09 - Debugging and Database Management in Robotics

- Troubleshoot and debug errors in code.
- Describe the role of diagnostics and troubleshooting to the engineering design process.
- Define a database, and identify basic components of databases.
- Describe how fields and records in different tables are related.
- Describe database rules and their importance.
- Analyze the use of flowcharts and pseudocode in designing a computer program.
- Describe the software development cycle.

*Fundamentals of Robotics - Unit 10 - Software Foundations of Robotics: AI, ML, and
Programming Environments*

- Explain and explore the types of robotic software.
- Describe how artificial intelligence (AI) and machine learning (ML) can be used in robotics.
- Explain coding environments for robots.
- Create a behavior case for a robot.
- Create keyword phrase for a robot.
- Create a question and answer sequence for a robot.

Fundamentals of Robotics - Unit Sim

- Understand how to create a rule, wildcard and anchor

FTTS Publisher

3 Way Communication

3 Way Communication

- Identify two reasons why 3-way communication training is needed
- Define 3-way communication
- Identify the steps to successful 3-way communication
- Identify the skills needed for successful 3-way communication
- Define hearing and listening
- Identify when 3-way communication is necessary

Event Reporting

Event Reporting

- List three types of reportable events
- List who is responsible for reporting events
- Identify two reasons why event report training is needed
- Identify when event reporting is necessary
- State the time frame required after an event in which the event must be reported
- Identify the references used for completion of event reporting
- Identify the DOE report needed for reporting an event
- Identify the reference where the event reporting steps can be found
- Identify the first step to be completed upon discovering a potential event
- Identify two rules regarding investigating a potential event

Gittel Grant

Environmental Engineering

Lesson 01: Air Pollution

- Define Respiration
- Distinguish between inhaling and exhaling
- Understand how pollutants affect respiration

Lesson 02: Plant Needs

- Define an organism
- Identify what an organism needs to survive

- Differentiate between plants and animals

Lesson 03: Hydroponics

- Identify causes of land pollution
- Define Hydroponics

Lesson 04: Plant Structure

- Identify parts of a plant
- Identify the function of each plant part
- Identify which life functions each plant part performs.

Lesson 05: Bubbly Science

- Understand the particle state of a gas
- Understand the particle state of a liquid
- Define condensation

Lesson 06: Floods

- Define Weather
- Identify the importance of weather alert systems
- Understand how levees limit flooding

Lesson 07: Oil Spills

- Identify the three spheres of the earth
- Identify the human impact of pollution on the biosphere
- Understand the damage caused by oil spills

Lesson 08: Microbes 1

- Define Microorganism
- Differentiate between bacteria, viruses, and fungi
- Understand that some microorganisms are helpful

Lesson 09: Microbes 2

- Classify bacteria based on their shape
- Understand the naming system used for bacteria

Lesson 10: Microbial Fuel Cell

- Define microbial fuel cell
- Identify different species of electrogenic bacteria

Lesson 11: Circuits

- Identify parts of a circuit
- Understand why metals conduct electricity

Lesson 12: Minerals

- Relate elements, minerals, and rocks
- Identify properties of minerals

Lesson 13: Forces and Energy

- Define a force
- Understand how forces act on earth
- Differentiate between potential and kinetic energy

Lesson 14: Hurricanes

- Define precipitation
- Understand how hurricanes form

Lesson 15: Earthquakes

- Understand why humans monitor weather
- Define an earthquake
- Differentiate between different seismic waves

Lesson 16: Bacterial Growth

- Identify the conditions necessary for bacterial growth
- Define binary fission

Lesson 17: Antibiotics

- Understand how antibiotics were discovered
- Understand when antibiotics are used

Lesson 18: Disinfectants

- Understand how antibiotics were discovered
- Understand when antibiotics are used

Lesson 19: Heart Rate

- Define heart rate
- Identity how different factors affect heart rate

Lesson 20: Sugar

- Understand how antibiotics were discovered
- Understand when antibiotics are used

Unit 1: Introduction to STEM

Unit 1: Introduction to STEM: Lesson 01-02

- Identify the four main kinds of engineering
- Identify which branch of engineering a specific application belongs to
- Define the job of a systems engineer
- Predict which jobs belong to a designer and which to an engineer

Unit 1: Introduction to STEM: Lesson 03-04

- Understand and apply all stages of the engineering design process.
- Plan a project using the engineering design process.

Unit 1: Introduction to STEM: Lesson 05-06

- Learn How To SCAMPER
- Evaluate The Usefulness of The Design Process When It Comes To Developing Solutions

Unit 1: Introduction to STEM: Lesson 07-08

- Understand how to use Tinkercad

Unit 1: Introduction to STEM: Lesson 09-10

- Identify different forces as a push or a pull.
- Analyze materials to determine their relative strength in compression and tension.
- Identify how the spring scale is used to measure force
- Differentiate between tension and compression forces.
- Understand what the unit "Newton" implies.

Unit 1: Introduction to STEM: Lesson 11-12

- Understand 4 main categories of materials and identify how each reacts with different forces applied.
- Understand intrinsic and extrinsic properties and develop an understanding of identifying properties.

Unit 1: Introduction to STEM: Lesson 13-14

- Understand that the internal structure determines the properties of materials

- Define thermal and electrical conductivity, hardness, ductility, malleability, luster, and the ability to reflect, refract, and absorb.

Unit 1: Introduction to STEM: Lesson 15-16

- Understand What is a textile?
- Understand History of Textiles
- Understand Careers in Textile Engineering

Unit 1: Introduction to STEM: Lesson 17-18

- Understand the 17 global goals and a commitment to solving real-world issues
- Identify real-world goals that they connect with

Unit 1: Introduction to STEM: Lesson 19-20

- Understand Project Management

Unit 1: Introduction to STEM: Lesson 21-25

- Completion

Unit 2: Electrical Engineering I

Unit 2: Electrical Engineering I: Lesson 01-02

- Define the word "force"
- Understand Effect of Distance on Magnitude of Force
- Understand Energy Transfers

Unit 2: Electrical Engineering I: Lesson 03-04

- Differentiate between the seven kinds of energy
- Define the seven types of energy
- Identify energy transfers
- Understand the law of conservation of energy

Unit 2: Electrical Engineering I: Lesson 05-06

- Understand how to charge a neutral object
- Differentiate between friction, conduction, and induction

Unit 2: Electrical Engineering I: Lesson 07-08

- Differentiate between static and kinetic friction.

Unit 2: Electrical Engineering I: Lesson 09-10

- Understand how an electrochemical cell works
- Develop an understanding of electrolyte effectiveness and potential differences.

Unit 2: Electrical Engineering I: Lesson 11-12

- Differentiate between conductors and insulators.
- Use digital circuit builders to develop an understanding of circuit basics
- Differentiate between open and closed circuits.

Unit 2: Electrical Engineering I: Lesson 13-14

- Identify careers and STEM fields where electrical engineering is key.
- Define and measure voltage using voltmeters

Unit 2: Electrical Engineering I: Lesson 15-16

- Understand Increasing or Decreasing Voltage

Unit 2: Electrical Engineering I: Lesson 17-18

- Learn about current, and how to use an ammeter.
- Identify what effect adding different components to a circuit will have on the voltage.

Unit 2: Electrical Engineering I: Lesson 19-20

- Understand how to Make a paper circuit

Unit 2: Electrical Engineering I: Lesson 21-25

- Completion

Unit 3: Electrical Engineering II

Unit 3: Electrical Engineering II: Lesson 01-02

- Study diagrams and build the corresponding circuits, and vice versa.
- Learn about circuit safety and identify components built to conquer problems

Unit 3: Electrical Engineering II: Lesson 03-04

- Build a series of circuits and determine how the electricity travels
- Differentiate between dependent and independent circuit components in a series circuit

Unit 3: Electrical Engineering II: Lesson 05-06

- Build a parallel circuit and determine how the electricity travels

- Differentiate between dependent and independent circuit components in a parallel circuit

Unit 3: Electrical Engineering II: Lesson 07-08

- Identify careers and STEM fields where circuit design is an applied skill.
- Learn about push-button, knife, and double-knife switches.

Unit 3: Electrical Engineering II: Lesson 09-10

- Understand how to construct a pressure plate switch
- Identify industry uses for the pressure plate switch
- Use CAD software to model a pressure plate switch

Unit 3: Electrical Engineering II: Lesson 11-12

- Identify how a resistor functions in a circuit
- Study appliances and identify electrical components in them

Unit 3: Electrical Engineering II: Lesson 13-14

- Identify how resistor color bands function in a circuit
- Study appliances and identify electrical components in them

Unit 3: Electrical Engineering II: Lesson 15-16

- Relate voltage, current, and resistance mathematically.

Unit 3: Electrical Engineering II: Lesson 17-18

- Learn how diodes behave in forward bias
- Learn how diodes behave in reverse bias
- Learn to diagram diodes in forward and reverse bias.

Unit 3: Electrical Engineering II: Lesson 19-20

- Design and execute a carnival arcade game with a user-activated buzzer or light

Unit 3: Electrical Engineering II: Lesson 21-25

- Completion

Unit 4: Robotics and Automation

Unit 4: Robotics and Automation: Lesson 01-02

- Understand electrical systems
- Identify system components

- Differentiate between open-loop and closed-loop circuits

Unit 4: Robotics and Automation: Lesson 03-04

- Understand sensors and indicators
- Identify different sensor/indicator pairs in their everyday experience
- Identify careers and STEM fields where creating electrical systems is an applied skill

Unit 4: Robotics and Automation: Lesson 05-06

- Learn about input and output
- Train a machine to recognize different movements, positions, or images
- Learn the informational sequencing of the user interface
- Identify careers and STEM fields where creating user interfaces is an applied skill

Unit 4: Robotics and Automation: Lesson 07-08

- Learn to code video sensing interactives
- Understand how to train a system to respond to changes in field of view

Unit 4: Robotics and Automation: Lesson 09-10

- Understand the physics principles involved in drone flight including lift and directional spin
- Understand how to calculate the payload a drone can carry
- Identify careers and STEM fields where building or programming unmanned aerial craft is an applied skill

Unit 4: Robotics and Automation: Lesson 11-12

- Learn to charge and power up the drone
- Gain fluency in the droneblocks platform

Unit 4: Robotics and Automation: Lesson 13-14

- Learn to apply angles, geometry, and specific measured distances as they command the drones to fly in specific shapes and patterns.

Unit 4: Robotics and Automation: Lesson 15-16

- Learn the importance of accurate measuring
- Review the metric system
- Learn sequencing, automation and loops.

Unit 4: Robotics and Automation: Lesson 17-18

- Master the coding commands for flips, height, distance, takeoff, landing, yaw, and navigation.

Unit 4: Robotics and Automation: Lesson 19-20

- Learn the importance of social collaboration, and effective group work in the engineering design process and problem-solving process.
- Be introduced to the Capstone project.

Unit 4: Robotics and Automation: Lesson 21-25

- Showcase mastery of block-based coding more advanced students can complete the coding in javascript or python
- Work in small groups to identify the payload of the drone and iterate a solution

Unit 5: Mechanical Engineering I

Unit 5: Mechanical Engineering I: Lesson 01-02

- Understand Newton's first law
- Identify instances where inertia is at play
- Connect aerospace engineering with principles of inertia

Unit 5: Mechanical Engineering I: Lesson 03-04

- Understand Newton's second law
- Identify instances where acceleration is at play
- Connect automotive engineering with principles of acceleration

Unit 5: Mechanical Engineering I: Lesson 05-06

- Understand Newton's third law
- Identify instances where action/reaction is at play
- Connect aerospace engineering with principles of action/reaction

Unit 5: Mechanical Engineering I: Lesson 07-08

- Understand the law of universal gravitation
- Research and understand weight as a result of varying gravity in different places
- Learn about the role of gravity in the creation of amusement park rides by mechanical engineers

Unit 5: Mechanical Engineering I: Lesson 09-10

- Differentiate between kinetic and potential energy

- Learn to read kinetic and potential energy diagrams for machines/movement
- Use CAD software to design and label the changing energy in a roller coaster.

Unit 5: Mechanical Engineering I: Lesson 11-12

- Understand the mathematical construct of work as a product of force and distance
- Learn to calculate efficiency

Unit 5: Mechanical Engineering I: Lesson 13-14

- Differentiate between the six simple machines
- Identify which simple machine each ordinary object is
- Understand the mathematical relationship between effort, resistance, and mechanical advantage

Unit 5: Mechanical Engineering I: Lesson 15-16

- Differentiate between the three classes of levers
- Identify which class of lever each everyday object is
- Develop an understanding of fulcrum, effort, resistance, effort arm and resistance arm

Unit 5: Mechanical Engineering I: Lesson 17-18

- Learn to calculate the mechanical advantage of a lever
- Learn how distance from the fulcrum affects the force placed on one end of the lever
- Learn how to balance a first-class lever.

Unit 5: Mechanical Engineering I: Lesson 19-20

- Learn the importance of social collaboration, and effective group work in the engineering design process and problem-solving process.
- Be introduced to the Capstone project.

Unit 5: Mechanical Engineering I: Lesson 21-25

- Study original Rube Goldberg Comics as well as current-day mega Rube Goldberg machines
- Understand the law of conservation of energy
- Use CAD software to model their Rube Goldberg machine

Unit 6: Mechanical Engineering II

Unit 6: Mechanical Engineering II: Lesson 01-02

- Understand the distribution of force through fluids
- Work with syringes and tubing to create hydraulic pressure

- Identify careers and STEM fields where developing hydraulic systems is an applied skill

Unit 6: Mechanical Engineering II: Lesson 03-04

- Differentiate between an engineer and a designer
- Understand color theory
- Understand color mixing

Unit 6: Mechanical Engineering II: Lesson 05-06

- Identify how inclined planes and screws are related
- Understand mathematically how to calculate the mechanical advantage of a screw

Unit 6: Mechanical Engineering II: Lesson 07-08

- Understand mathematically how to calculate the mechanical advantage of a wheel and axle
- Identify wheels and axles in everyday life

Unit 6: Mechanical Engineering II: Lesson 09-10

- Understand the importance of the teeth on the gears
- Calculate the direction of each gear
- Use 3D gears to learn about gear placement, direction and speed

Unit 6: Mechanical Engineering II: Lesson 11-12

- Understand how to calculate gear ratio
- Differentiate between gearing up and gearing down
- Identify careers and STEM fields where creating gear systems is an applied skill

Unit 6: Mechanical Engineering II: Lesson 13-14

- Understand and apply angles and circle mathematics to create a perfect clock

Unit 6: Mechanical Engineering II: Lesson 15-16

- Learn about air pressure
- Identify how Bernoulli's principle plays into certain phenomenon
- Learn applications of both air pressure and Bernoulli's principle in the aerospace industry

Unit 6: Mechanical Engineering II: Lesson 17-18

- Understand pneumatic force
- Compare and contrast pneumatics and hydraulics

- Identify industries where pneumatic principles are applied skills

Unit 6: Mechanical Engineering II: Lesson 19-20

- Learn the importance of social collaboration, and effective group work in the engineering design process and problem-solving process
- Be introduced to the Capstone project

Unit 6: Mechanical Engineering II: Lesson 21-25

- Work in small groups to complete this capstone project
- Understand the circuitry and mechanics of their project
- Use CAD software to model their machines and draw the circuitry

Unit 7: STEM Career Exploration

Unit 7: STEM Career Exploration: Lesson 01-02

- Learn about magnetic force
- Understand factors that increase or decrease the magnitude of magnetic force
- Learn about a day in the life of a magnetic engineer

Unit 7: STEM Career Exploration: Lesson 03-04

- Connect angles and point of view as they learn to draw using horizon lines and a vanishing point
- Learn to create section and cross-section views
- Learn accepted ANSI dimensional standards for measurement and drawing
- Learn about a day in the life of an architect

Unit 7: STEM Career Exploration: Lesson 05-06

- Learn accepted ANSI dimensional standards for measurement and drawing
- Learn about a day in the life of a civil engineer

Unit 7: STEM Career Exploration: Lesson 07-08

- Learn about exothermic and endothermic reactions
- Learn chemical safety
- Learn about chemical reactions, chemical indicators, and limiting reagents
- Learn how chemical engineers harness material properties to create an effect
- Learn about a day in the life of a chemical engineer

Unit 7: STEM Career Exploration: Lesson 09-10

- Learn about spherification

- Learn about chemical safety
- Learn about food safety
- Learn about a day in the life of a food scientist

Unit 7: STEM Career Exploration: Lesson 11-12

- Learn about environmental hazards
- Learn about conservation
- Learn about Titration
- Learn about a day in the life of an environmental engineer

Unit 7: STEM Career Exploration: Lesson 13-14

- Learn about safety in the lab
- Learn about microorganisms
- Learn about growing and inhibiting the growth of microorganisms
- Learn about a day in the life of a biomedical engineer

Unit 7: STEM Career Exploration: Lesson 15-16

- Learn about rockets, takeoff, orbit, and construction
- Learn about a day in the life of an astronautical engineer

Unit 7: STEM Career Exploration: Lesson 17-18

- Learn about cars, fuel, acceleration, drag, and momentum
- Learn about a day in the life of a mechanical engineer

Unit 7: STEM Career Exploration: Lesson 19-20

- Learn the importance of social collaboration, and effective group work in the engineering design process and problem-solving process
- Be introduced to the Capstone project

Unit 7: STEM Career Exploration: Lesson 21-25

- Research a STEM or engineering career they have a personal interest in
- Demonstrate mastery over the history, job options, and developments in this field

Open Textbooks

Generative AI: Practical Uses in Education

Generative AI: Practical Uses in Education: 01 About GenAI

- Understand the historical progression and exponential growth of AI capabilities over time.
- Explain how Generative AI tools convert plain language prompts into various content formats, including text, code, images, videos, and audio.
- Describe the training process of Generative AI tools, specifically their reliance on vast datasets of content in the formats they are designed to produce.
- Articulate how AI tools personalize user interactions and how user engagement and feedback contribute to the improvement of future Large Language Models (LLMs).
- Understand that AI has a the diverse range of outputs that can be tailored to specific user needs.
- Recognize the potential benefits and drawbacks of AI tool integration for both students and instructors in educational settings.
- Understand that AI outputs have potential errors and biases and learn strategies for vetting and adapting them for accurate, real-world application.
- Recognize key ethical and practical downsides associated with generative AI tools, including copyright, privacy, labor, and environmental concerns.
- Understand that educators who use AI tools need to be aware of their risks and drawbacks, and should ensure students are informed as well.
- Recognize that a number of AI chatbots are available to use and each has strengths and weaknesses
- Identify those AI tools which can convert text, image or audio prompts to images and videos
- Understand that specialized AI tools can perform specific tasks related to teaching and learning

Generative AI: Practical Uses in Education: 02 Interacting with AI Tools in Education

- Understand that Institutional and course AI policies should be created, which encourage responsible and ethical use of AI tools
- Explain how involving students in the co-creation of AI policies can enhance their understanding and adherence to these guidelines

- Understand that students need clear guidelines on each assignment about how AI tools can and can't be used
- Understand that learning outcomes need to be revised to focus on distinctive human skills
- Understand that educators need to clarify the importance of course learning outcomes, especially when it seems like an AI tool can complete the task reasonably well
- Understand the importance of students being taught basic AI prompting skills, strategies for learning a new AI tool and how to critically evaluate AI output
- Recognize how students can adapt AI outputs for real-world use and how they can use AI tools ethically at school and in the workplace

Generative AI: Practical Uses in Education: 03 Practical Uses for Courses

- Identify the many ways that AI can enhance student learning
- Understand that AI tools can make errors and that students engaging with AI tools need enough subject-matter knowledge to recognize AI hallucinations and need to know how to fact-check AI output
- Identify and explain several styles of AI prompting including the One Big Prompt strategy, prompt chaining, and question-and-answer prompting
- Understand that AI tools perform better with more information and identify different types of additional information that can be provided to AI
- Understand that AI tool initial outputs are likely not ready for use in a professional setting and will need a combination of reprompting and manual refinement
- Understand the ways in which AI tools will evaluate the language used in your prompt to decide how to produce content for you
- Understand that custom instructions can be set that show an AI tool how you'd like it to produce content

Generative AI: Practical Uses in Education: 04 Practical Uses for Preparatory and Admin Work

- Understand that AI tools can help with course development by supplying initial ideas and frameworks
- Understand that AI tools can use limited information about a course to produce suggested learning outcomes, assignments, schedules, and more
- Understand that AI tools can produce first drafts of lesson plans that can be adapted for use in class
- Understand that AI tools can generate ideas and instructions for classroom activities

- Understand that AI tools are useful for brainstorming examples, questions, and case studies
- Understand that AI tools can assist with producing assessment questions, topics, and scenarios
- Understand that AI tools can produce detailed rubrics
- Understand how students can use AI tools as a way to get more formative feedback
- Understand that AI tools can provide some assistance with summative feedback
- Identify ways AI tools can translate feedback, potentially increasing student interest in reviewing feedback
- Understand that AI tools can write first drafts of emails, templates, meeting agendas, and meeting minutes
- Understand that AI tools can review large amounts of information in order to summarize or make recommendations

Integrating AI in Business Ed

Integrating AI in Business Ed: 1. Foundations of Generative AI

- Identify AI's profound and ongoing impact on daily life and recognize Generative AI (GenAI) as a significant recent advancement capable of creating new content
- Describe how Generative AI (GenAI) is transforming business education
- Identify key strengths of Generative AI (GenAI) in business education and acknowledge that it also presents weaknesses that require careful consideration for ethical and effective integration.
- Identify and explain key ethical considerations of AI in education and describe strategies for their responsible implementation within business education contexts
- Explain the relatively brief but rapidly accelerating history of Artificial Intelligence (AI)

Integrating AI in Business Ed: 2. Design & Development using AI

- Define Learning Experience Design (LXD) and explain its human-centered, goal-oriented, and iterative nature
- Identify at least three stages of the Learning Experience Design (LXD) process where generative AI tools can support efforts
- Describe how generative AI can be utilized to create or refine course syllabi, including generating content like learning objectives, topics, and policies.
- Explain how AI can impact assessment design by identifying tasks AI can easily perform and outlining strategies for creating "AI-resistant" or authentic assessments.

Integrating AI in Business Ed: 3. Assessment & Engagement using AI

- Identify and describe at least three tangible ways to incorporate Generative AI (GenAI) into classroom activities
- Explain how GenAI can be used to develop students' critical thinking skills and describe strategies to teach students about responsible AI use and plagiarism avoidance
- Explain how educators can use generative AI as an instructional assistant to create or enhance course materials
- Identify key ways students can use AI tools to enhance their learning experiences and research skills while also recognizing the inherent limitations of AI in these processes

Integrating AI in Business Ed: 4. Resource Repository

- Explain why policies and guidelines for Generative AI (GenAI) are necessary in education
- Identify at least three examples of institutions or organizations that have developed or are developing guidelines for the ethical use of GenAI in post-secondary education
- Categorize and locate various AI tools and resources relevant to business education
- Identify and access at least three curated resources or guides specifically designed to assist educators in integrating Generative AI into their teaching practices

Concepts of Biology

COB: Unit 1: Chapter 01: Introduction to Biology

- Identify and describe the properties of life
- Describe the levels of organization among living things
- List examples of different sub disciplines in biology
- Identify the shared characteristics of the natural sciences
- Understand the process of scientific inquiry
- Compare inductive reasoning with deductive reasoning
- Describe the goals of basic science and applied science

COB: Unit 1: Chapter 02: Introduction to the Chemistry of Life

- Describe matter and elements
- Describe the interrelationship between protons, neutrons, and electrons, and the ways in which electrons can be donated or shared between atoms
- Describe the properties of water that are critical to maintaining life
- Describe the ways in which carbon is critical to life
- Explain the impact of slight changes in amino acids on organisms

- Describe the four major types of biological molecules
- Understand the functions of the four major types of molecules

COB: Unit 1: Chapter 03: Introduction to Cell Structure and Function

- Describe the roles of cells in organisms
- Compare and contrast light microscopy and electron microscopy
- Summarize the cell theory
- Name examples of prokaryotic and eukaryotic organisms
- Compare and contrast prokaryotic cells and eukaryotic cells
- Describe the relative sizes of different kinds of cells
- Describe the structure of eukaryotic plant and animal cells
- State the role of the plasma membrane
- Summarize the functions of the major cell organelles
- Describe the cytoskeleton and extracellular matrix
- Understand the fluid mosaic model of membranes
- Describe the functions of phospholipids, proteins, and carbohydrates in membranes
- Explain why and how passive transport occurs
- Understand the processes of osmosis and diffusion
- Define tonicity and describe its relevance to passive transport
- Understand how electrochemical gradients affect ions
- Describe endocytosis, including phagocytosis, pinocytosis, and receptor-mediated endocytosis
- Understand the process of exocytosis

COB: Unit 1: Chapter 04: Introduction to How Cells Obtain Energy

- Explain what metabolic pathways are
- State the first and second laws of thermodynamics
- Explain the difference between kinetic and potential energy
- Describe endergonic and exergonic reactions
- Discuss how enzymes function as molecular catalysts
- Discuss the way in which carbohydrate metabolic pathways, glycolysis, and the citric acid cycle interrelate with protein and lipid metabolic pathways
- Explain why metabolic pathways are not considered closed systems
- Explain how ATP is used by the cell as an energy source
- Describe the overall result in terms of molecules produced of the breakdown of glucose by glycolysis

- Describe the location of the citric acid cycle and oxidative phosphorylation in the cell
- Describe the overall outcome of the citric acid cycle and oxidative phosphorylation in terms of the products of each
- Describe the relationships of glycolysis, the citric acid cycle, and oxidative phosphorylation in terms of their inputs and outputs.
- Discuss the fundamental difference between anaerobic cellular respiration and fermentation
- Describe the type of fermentation that readily occurs in animal cells and the conditions that initiate that fermentation

COB: Unit 1: Chapter 05: Introduction to Photosynthesis

- Summarize the process of photosynthesis
- Explain the relevance of photosynthesis to other living things
- Identify the reactants and products of photosynthesis
- Describe the main structures involved in photosynthesis
- Explain how plants absorb energy from sunlight
- Describe how the wavelength of light affects its energy and color
- Describe how and where photosynthesis takes place within a plant
- Describe the Calvin cycle
- Define carbon fixation
- Explain how photosynthesis works in the energy cycle of all living organisms

COB: Unit 2: Chapter 06: Introduction to Reproduction at the Cellular Level

- Describe the prokaryotic and eukaryotic genome
- Distinguish between chromosomes, genes, and traits
- Describe the three stages of interphase
- Discuss the behavior of chromosomes during mitosis and how the cytoplasmic content divides during cytokinesis
- Define the quiescent G₀ phase
- Explain how the three internal control checkpoints occur at the end of G₁, at the G₂→M transition, and during metaphase
- Explain how cancer is caused by uncontrolled cell division
- Understand how proto-oncogenes are normal cell genes that, when mutated, become oncogenes
- Describe how tumor suppressors function to stop the cell cycle until certain events are completed

- Explain how mutant tumor suppressors cause cancer
- Describe the process of binary fission in prokaryotes
- Explain how FtsZ and tubulin proteins are examples of homology

COB: Unit 2: Chapter 07: Introduction to the Cellular Basis of Inheritance

- Explain that variation among offspring is a potential evolutionary advantage resulting from sexual reproduction
- Describe the three different life-cycle strategies among sexual multicellular organisms and their commonalities
- Understand why you could never create a gamete that would be identical to either of the gametes that made you
- Describe the behavior of chromosomes during meiosis
- Describe cellular events during meiosis
- Explain the differences between meiosis and mitosis
- Explain the mechanisms within meiosis that generate genetic variation among the products of meiosis
- Explain how nondisjunction leads to disorders in chromosome number
- Describe how errors in chromosome structure occur through inversions and translocations

COB: Unit 2: Chapter 08: Introduction to Patterns of Inheritance

- Explain the scientific reasons for the success of Mendel's experimental work
- Explain the relationship between genotypes and phenotypes in dominant and recessive gene systems
- Use a Punnett square to calculate the expected proportions of genotypes and phenotypes in a monohybrid cross
- Explain Mendel's law of segregation and independent assortment in terms of genetics and the events of meiosis
- Explain the purpose and methods of a test cross
- Identify non-Mendelian inheritance patterns such as incomplete dominance, codominance, multiple alleles, and sex linkage from the results of crosses
- Explain the effect of linkage and recombination on gamete genotypes
- Explain the phenotypic outcomes of epistatic effects among genes
- Explain polygenic inheritance
- Describe the expected outcomes of monohybrid crosses involving dominant and recessive alleles.

COB: Unit 3: Chapter 09: Introduction to Molecular Biology

- Describe the structure of DNA
- Describe how eukaryotic and prokaryotic DNA is arranged in the cell
- Explain the process of DNA replication
- Explain the main steps of transcription
- Describe how eukaryotic mRNA is processed
- Describe the different steps in protein synthesis
- Discuss the role of ribosomes in protein synthesis
- Describe the genetic code and how the nucleotide sequence determines the amino acid and the protein sequence
- Discuss why every cell does not express all of its genes
- Describe how prokaryotic gene expression occurs at the transcriptional level
- Understand that eukaryotic gene expression occurs at the epigenetic, transcriptional, post-transcriptional, translational, and post-translational levels
- Explain the importance of telomerase to DNA replication
- Describe mechanisms of DNA repair
- Explain the central dogma

COB: Unit 3: Chapter 10: Introduction to Biotechnology

- Explain the basic techniques used to manipulate genetic material
- Explain molecular and reproductive cloning
- Describe uses of biotechnology in medicine
- Describe uses of biotechnology in agriculture
- Define genomics and proteomics
- Define whole genome sequencing
- Explain different applications of genomics and proteomics

COB: Unit 4: Chapter 11: Introduction to the Body's Systems

- Describe the cardiac cycle
- Explain how blood flows through the body
- List the different types of hormones and explain their roles in maintaining homeostasis
- Explain how hormones work
- Explain how hormone production is regulated
- Describe the role of different glands in the endocrine system
- Explain how the different glands work together to maintain homeostasis

- Discuss the axial and appendicular parts of the skeletal system
- Explain the role of joints in skeletal movement
- Explain the role of muscles in locomotion
- Explain the concept of homeostasis
- Describe thermoregulation of endothermic and ectothermic animals
- Explain how the kidneys serve as the main osmoregulatory organs in the human body
- Explain the processes of digestion and absorption
- Explain the specialized functions of the organs involved in processing food in the body
- Describe the ways in which organs work together to digest food and absorb nutrients
- Describe the essential nutrients required for cellular function that cannot be synthesized by the animal body
- Describe how excess carbohydrates and energy are stored in the body
- Describe the passage of air from the outside environment to the lungs
- Explain how the lungs are protected from particulate matter
- Describe the function of the circulatory system
- Describe the form and function of a neuron
- Describe the basic parts and functions of the central nervous system
- Describe the basic parts and functions of the peripheral nervous system

COB: Unit 4: Chapter 12: Introduction to the Immune System and Disease

- Describe how viruses were first discovered and how they are detected
- Describe how vaccines are used in prevention and treatment of viral diseases
- Describe the body's innate physical and chemical defenses
- Explain the inflammatory response
- Describe the complement system
- Explain adaptive immunity
- Describe cell-mediated immune response and humoral immune response
- Describe immune tolerance
- Describe hypersensitivity
- Define autoimmunity
- Explain the detailed steps of viral replication

COB: Unit 4: Chapter 13: Introduction to Animal Reproduction and Development

- Describe advantages and disadvantages of asexual and sexual reproduction
- Discuss asexual reproduction methods

- Discuss the role of cleavage and gastrulation in animal development
- Describe organogenesis
- Describe human male and female reproductive anatomies
- Discuss internal and external methods of fertilization
- Explain how the embryo forms from the zygote
- Discuss sexual reproduction methods
- Describe the roles of male and female reproductive hormones
- Describe the role of hormones in human reproduction
- Describe spermatogenesis and oogenesis and discuss their differences and similarities

COB: Unit 4: Chapter 14: The Animal Body: Basic Form and Function

- Describe the various types of body plans that occur in animals
- Describe epithelial tissues
- Discuss the different types of connective tissues in animals
- Describe three types of muscle tissues
- Describe nervous tissue
- Define homeostasis
- Describe thermoregulation of endothermic and ectothermic animals
- Discuss positive and negative feedback mechanisms used in homeostasis
- Describe the factors affecting homeostasis

COB: Unit 4: Chapter 15: Animal Nutrition and the Digestive System

- Explain why an animal's diet should be balanced and meet the needs of the body
- Define the primary components of food
- Describe the essential nutrients required for cellular function that cannot be synthesized by the animal body
- Explain how energy is produced through diet and digestion
- Describe how excess carbohydrates and energy are stored in the body
- Describe the process of digestion
- Detail the steps involved in digestion and absorption
- Define elimination
- Explain the role of both the small and large intestines in absorption
- Discuss the role of neural regulation in digestive processes
- Explain how hormones regulate digestion
- Describe the ways in which organs work together to digest food and absorb nutrients

- Explain the specialized functions of the organs involved in processing food in the body
- Compare and contrast different types of digestive systems
- Explain the processes of digestion and absorption

COB: Unit 4: Chapter 16: The Nervous System

- List and describe the functions of the structural components of a neuron
- List and describe the four main types of neurons
- Compare the functions of different types of glial cells
- Describe the basis of the resting membrane potential
- Explain the stages of an action potential and how action potentials are propagated
- Explain the similarities and differences between chemical and electrical synapses
- Describe long-term potentiation and long-term depression
- Identify the spinal cord, cerebral lobes, and other brain areas on a diagram of the brain
- Describe the basic functions of the spinal cord, cerebral lobes, and other brain areas
- Describe the organization and functions of the sympathetic and parasympathetic nervous systems
- Describe the organization and function of the sensory-somatic nervous system
- Describe the symptoms, potential causes, and treatment of several examples of nervous system disorders

COB: Unit 4: Chapter 17: Sensory Systems

- Identify the general and special senses in humans
- Describe three important steps in sensory perception
- Explain the concept of just-noticeable difference in sensory perception
- Describe four important mechanoreceptors in human skin
- Describe the topographical distribution of somatosensory receptors between glabrous and hairy skin
- Explain why the perception of pain is subjective
- Explain in what way smell and taste stimuli differ from other sensory stimuli
- Identify the five primary tastes that can be distinguished by humans
- Explain in anatomical terms why a dog's sense of smell is more acute than a human's
- Describe the relationship of amplitude and frequency of a sound wave to attributes of sound
- Trace the path of sound through the auditory system to the site of transduction of sound
- Identify the structures of the vestibular system that respond to gravity
- Explain how electromagnetic waves differs from sound waves

- Trace the path of light through the eye to the point of the optic nerve
- Explain tonic activity as it is manifested in photoreceptors in the retina

COB: Unit 4: Chapter 18: The Endocrine System

- Discuss the role of different types of hormone receptors
- List the different types of hormones
- Explain their role in maintaining homeostasis
- Explain how hormones work
- Explain how hormones regulate the excretory system
- Discuss the role of hormones in the reproductive system
- Describe how hormones regulate metabolism
- Explain the role of hormones in different diseases
- Explain how hormone production is regulated
- Discuss the different stimuli that control hormone levels in the body
- Describe the role of different glands in the endocrine system
- Explain how the different glands work together to maintain homeostasis

COB: Unit 4: Chapter 19: The Musculoskeletal System

- Discuss the different types of skeletal systems
- Explain the role of the human skeletal system
- Compare and contrast different skeletal systems
- Classify the different types of bones in the skeleton
- Explain the role of the different cell types in bone
- Explain how bone forms during development
- Classify the different types of joints on the basis of structure
- Explain the role of joints in skeletal movement
- Classify the different types of muscle tissue
- Explain the role of muscles in locomotion

COB: Unit 4: Chapter 20: The Respiratory System

- Name and describe lung volumes and capacities
- Understand how gas pressure influences how gases move into and out of the body
- Describe how the structures of the lungs and thoracic cavity control the mechanics of breathing
- Explain the importance of compliance and resistance in the lungs
- Describe the passage of air from the outside environment to the lungs

- Explain how the lungs are protected from particulate matter
- Discuss problems that may arise due to a V/Q mismatch
- Describe how oxygen is bound to hemoglobin and transported to body tissues
- Explain how carbon dioxide is transported from body tissues to the lungs

COB: Unit 4: Chapter 21: The Circulatory System

- Compare red and white blood cells
- List the basic components of the blood
- Compare and contrast the organization and evolution of the vertebrate circulatory system.
- Describe an open and closed circulatory system
- Describe interstitial fluid and hemolymph
- Describe blood plasma and serum
- Describe the structure of the heart and explain how cardiac muscle is different from other muscles
- Describe the cardiac cycle
- Explain the structure of arteries, veins, and capillaries, and how blood flows through the body
- Describe the system of blood flow through the body
- Describe how blood pressure is regulated

COB: Unit 4: Chapter 22: Osmotic Regulation and Excretion

- Define osmosis and explain its role within molecules
- Explain why osmoregulation and osmotic balance are important body functions
- Describe active transport mechanisms
- Explain osmolarity and the way in which it is measured
- Describe osmoregulators or osmoconformers and how these tools allow animals to adapt to different environments
- Explain how the kidneys serve as the main osmoregulatory organs in mammalian systems
- Describe the structure of the kidneys and the functions of the parts of the kidney
- Describe how the nephron is the functional unit of the kidney and explain how it actively filters blood and generates urine
- Detail the three steps in the formation of urine: glomerular filtration, tubular reabsorption, and tubular secretion
- Explain how vacuoles, present in microorganisms, work to excrete waste

- Describe the way in which flame cells and nephridia in worms perform excretory functions and maintain osmotic balance
- Explain how insects use Malpighian tubules to excrete wastes and maintain osmotic balance
- Compare and contrast the way in which aquatic animals and terrestrial animals can eliminate toxic ammonia from their systems
- Compare the major byproduct of ammonia metabolism in vertebrate animals to that of birds, insects, and reptiles
- Explain how hormonal cues help the kidneys synchronize the osmotic needs of the body
- Describe how hormones like epinephrine, norepinephrine, renin-angiotensin, aldosterone, anti-diuretic hormone, and atrial natriuretic peptide help regulate waste elimination, maintain correct osmolarity, and perform other osmoregulatory functions

COB: Unit 4: Chapter 23: The Immune System

- Describe physical and chemical immune barriers
- Explain immediate and induced innate immune responses
- Describe immune tolerance
- Describe cell-mediated immune response and humoral immune response
- Discuss natural killer cells
- Describe major histocompatibility class I molecules
- Summarize how the proteins in a complement system function to destroy extracellular pathogens
- Explain adaptive immunity
- Compare and contrast adaptive and innate immunity
- Describe hypersensitivity
- Define autoimmunity
- Discuss antibody production
- Describe the structure and function of antibodies
- Explain cross-reactivity

COB: Unit 4: Chapter 24. Animal Reproduction and Development

- Discuss sexual reproduction methods
- Discuss internal and external methods of fertilization
- Describe the methods used by animals for development of offspring during gestation
- Describe the anatomical adaptations that occurred in animals to facilitate reproduction

- Describe human male and female reproductive anatomies
- Describe the process of menopause
- Describe labor and delivery
- Discuss asexual reproduction methods
- Describe advantages and disadvantages of asexual and sexual reproduction
- Discuss the human sexual response
- Describe spermatogenesis and oogenesis and discuss their differences and similarities
- Describe the roles of male and female reproductive hormones
- Discuss the interplay of the ovarian and menstrual cycles
- Explain fetal development during the three trimesters of gestation
- Compare the efficacy and duration of various types of contraception
- Discuss causes of infertility and the therapeutic options available
- Discuss how fertilization occurs
- Explain how the embryo forms from the zygote
- Discuss the role of cleavage and gastrulation in animal development
- Describe the process of organogenesis
- Identify the anatomical axes formed in vertebrates

Digital Skills: Artificial Intelligence

Digital Skills: Artificial Intelligence

- Define artificial intelligence
- Understand the differences between ANI, AGI and ASI
- Define Predictive AI
- Define Generative AI
- Describe GANs
- Describe CNNs
- Outline various ethical implications and misconceptions surrounding AI
- Explain ways generative AI tools can be used
- Know how to use AI responsibly in your studies
- Know how and where to check information generated by AI tools.

Environmental Science

Environmental Science: Chapter 01

- Explain the role of human beings in modifying ecosystems and human impacts on global warming, agriculture, food, nutrition, starvation, and environmental justice.

- Describe renewable and non-renewable energy resources.
- Identify environmental hazards and describe their toxic effects.
- Differentiate between biological, physical, and chemical stressors in the environment and their effects on biodiversity and natural resources.
- Trace the history of environmental science at local and global levels, the role of environmental science as an interdisciplinary subject, and its interrelationships with other Science, Technology, Engineering, and Mathematics (STEM) fields.
- Define characteristics of all living beings (biota) based on the six kingdoms, their role in ecosystems, and their interaction with non-living (abiotic) factors, including the hydrologic cycle and the biogeochemical cycle of major elements: carbon (C), nitrogen (N), phosphorus (P), and sulfur (S).

Environmental Science: Chapter 02

- Explain the hydrologic cycle and its importance for living organisms.
- Explain the world's environmental need for water management to prevent water scarcity.
- Explain how burning fossil fuel contributes to pollutants in the environment.
- Acknowledge how air quality management is important for a clean and healthy atmosphere.
- Identify how water is being polluted.
- Classify the different types of water and their availability for human consumption.

Environmental Science: Chapter 03

- Define biodiversity and explain its components, including genetic, species, and ecosystem diversity.
- Explain the utilitarian value and ecological, economic, cultural, and ethical importance of biodiversity.
- Discuss and evaluate conservation strategies and management practices aimed at preserving biodiversity, such as protected areas, habitat restoration, sustainable resource management, and captive breeding programs.
- Identify and analyze various threats to biodiversity, such as habitat loss, pollution, climate change, invasive species, and overexploitation.
- Describe methods and techniques used to measure and assess biodiversity, including species richness, species abundance, and diversity indices.
- Identify techniques for monitoring population dynamics, distribution, and abundance of species.

Environmental Science: Chapter 04

- Define energy and explain its properties.
- List specific examples of non-renewable energy sources.
- Describe the types of non-renewable sources utilized for energy extraction and how these sources are formed.
- Describe arguments for non-renewable energy.
- List specific examples of renewable energy sources.
- Describe the advantages and disadvantages of renewable energy sources (i.e., solar, wind, hydroelectric, and geothermal).
- Describe arguments for renewable energy.
- Explain innovative practices of energy implementation in the digital age.

Environmental Science: Chapter 05

- Describe a way that biodegradable and non-biodegradable substances are constantly being added to the environment.
- Explain types of biodegradable waste produced by humans from agriculture and non-agricultural sources.
- Differentiate among the non-biodegradable substances that are increasing in our environment.
- Detail the impact of plastic pollution as nanoplastics are creating a different level of pollutants in our environment.
- Identify environmental pollutants in terms of organic and inorganic substances and cumbersome metal generation.
- Explain how municipality waste is becoming an environmental hazard.
- Identify waste management strategies taken by the government and non-profit organizations.

Environmental Science: Chapter 06

- Describe the various types of environmental hazards.
- Explain the causes of hazards and how biota respond to changes in ecosystems.
- Differentiate natural and anthropogenic hazards with examples.
- Explain the differences among various types of environmental hazards.
- Explain the most common natural and man-made hazards in the state of Louisiana.

Environmental Science: Chapter 07

- Explain what nutrients are and give examples.

- Discuss the concept of nutrient cycling and describe important compartments and fluxes.
- Describe factors that affect the development of major soil types.
- Describe the cycles of carbon, nitrogen, phosphorus, and sulfur.

Environmental Science: Chapter 08

- Outline the physical basis of Earth's greenhouse effect and describe how human influences may be causing it to intensify.
- Explain the term greenhouse gas (GHG).
- Describe how the various GHGs vary in their effectiveness and influence on the greenhouse effect.
- Identify which GHGs have been increasing in concentration in the atmosphere and give the reasons for those changes.
- Explain the probable climatic consequences of an intensification of the greenhouse effect and describe possible economic and ecological effects.
- Discuss strategies for reducing the intensity of the human influence on the greenhouse effect.

Environmental Science: Chapter 09

- Explain the difference between environmental health and public health.
- Describe how environmental factors interact in soil, water, air, and living beings.
- Explain how environmental pollution impacts public health.
- Explain how environmental and public health relate to the economy.
- Explain the role of government in environmental and public health.

Environmental Science: Chapter 10

- List the most important plants and animals in agriculture; provide an overview of the management systems used in their cultivation.
- Explain how organic agriculture uses a more ecological approach to the cultivation of crops.
- Explain the difference between macronutrients and micronutrients.
- Explain the four pillars of food security.
- Provide an overview of the factors leading to global starvation and malnutrition.
- Describe global, national, and state strategies to address nutrition challenges.
- Identify nutritional connections between human health and environmental factors.

Environmental Science: Chapter 11

- Explain the significance of environmental justice in the context of environmental science.
- Define environmental ethics and how communities are affected in decision-making.
- Explain the interconnectedness of social, economic, and environmental factors relating to environmental justice.
- Differentiate between the environmental worldviews.
- Explain significant incidents of environmental injustice (i.e., environmental racism).

Geographic Information Systems and Cartography

GIS and Cartography: 01 Intro to GIS

- Illustrate how we think geographically and spatially daily with mental maps to highlight the importance of asking geographic questions.
- Explain how the fundamental concepts of scale, location, direction, distance, space, and navigation are relevant to geography and geographic information systems.
- Define how a geographic information system is applied, its development, and its future.

GIS and Cartography: 02 Spatially Representing Earth

- Compare primary and secondary data sources and determine the importance of metadata and data standards.
- Describe data and information and how it is organized into files for use in a geographic information system.
- Identify and evaluate key considerations when searching for spatial and nonspatial data.

GIS and Cartography: 06 Geospatial Data Characteristics and Visualization

- Compare the most frequently used distribution, central tendency, and dispersion measures.
- Explain the basics of the SQL language and understand the various query techniques available in a geographic information system.
- Describe the methodologies available to parse data into various classes for visual representation in a map.

GIS and Cartography: 08 Raster Data and Imagery Analysis

- Explain the single and multiple raster geoprocessing techniques

- Describe how local, neighborhood, zonal, and global analysis can be applied to raster datasets.
- Describe the concepts and terms related to GIS surfaces, how to create them, and how they are used to answer specific spatial and temporal questions.
- Explain how to apply fundamental raster surface analyses to terrain mapping applications.

GIS and Cartography: 03 Spatial and Nonspatial Data

- Identify and explain at least three distinctive properties of geographic data.
- Outline the kinds of questions that GIS can help answer.
- Define and describe data and information and how it is organized into files for use in a computing and geographic information systems environment.
- Highlight the difference between primary and secondary data sources and understand the importance of metadata and data standards.
- Recognize and name basic database operations.
- Identify and evaluate key considerations when searching for spatial and nonspatial data.
- Recognize and name basic approaches to geographic representation.

GIS and Cartography: 04 Geospatial Data Models

- Explain how raster data models are implemented in geographic information systems applications.
- Describe how vector data models are implemented in geographic information systems applications.
- Determine how satellite imagery, aerial photography, and unmanned aerial systems are implemented in geographic information systems applications.

GIS and Cartography: 05 Geospatial Data Management

- Introduce different data types, measurement scales, and data capture methods.
- Understand the basic properties of a relational database management system.
- Overview of a sample of the most common vectors, raster, and hybrid file formats.
- Ascertain the diverse types of error inherent in geospatial datasets.

GIS and Cartography: 07 Vector Data Models and Analysis

- Demonstrate knowledge of how vector data models are implemented in geographic information systems.

- Demonstrate knowledge of concepts and terms related to the variety of single overlay analysis techniques available to analyze and manipulate the spatial attributes of a vector feature dataset.
- Demonstrate knowledge of the concepts and terms of implementing basic multiple-layer operations and methodologies used on vector feature datasets.

GIS and Cartography: 09 Cartographic Principles

- Describe the properties of color and how best to utilize them in your cartographic projects.
- Explain how best to utilize point, line, and polygon symbols to assist in interpreting your map and its features.
- Familiarize yourself with the properties of cartographic principles that contribute to effective map design.

Introduction to Aerospace Flight Vehicles

IAFV: 01 Introductory

- Consider where the continued advances in space flight technology might take humankind another half-century from now.
- Understand some of the primary disciplines and activities pursued by engineers working in aeronautics and astronautics.
- Know more about the myriad of multidisciplinary technical problems that aerospace engineers face.
- Better appreciate some of the roles and responsibilities of an aerospace engineer.
- Appreciate more about the historical evolution of airplanes and other aircraft types.
- Identify the critical challenges of flight and subsequent technological advancements in the history of aeronautics.
- Consider where the continued advances in aeronautics and aviation might take humankind in another half-century.
- Appreciate the historical evolution of rockets, launch vehicles, and different spacecraft designs.
- Identify some key challenges and technological advancements in the history of astronautics.
- Understand the basic principles of launching a rocket, including multi-stage rockets.

IAFV: 02 Preparations

- Remember the essential mathematics that may have already been forgotten.

- Review algebraic manipulations using some simple examples.
- Revise the rules of calculus (differentiation and integration) with examples.
- Comfortably use the concepts associated with vectors.
- Understand the meaning of the primary vector operations such as scalar product, cross-product, gradient, divergence, and curl.
- Know how to interpret line integrals, surface integrals, and volume integrals.
- Appreciate the meaning of the substantial derivative and the Laplace operator.
- Know about the need to use ordinary and partial differential equations in engineering.
- Review the numerical rules of accuracy, significant digits, and rounding.
- Review SI (metric) and USC (U.S. or British) units of measurement and their proper use.
- Understand the differences between base and derived units.
- Know how to convert between different units using conversion factors.
- Learn about the conventions and accepted practices of using units.
- Be aware of the special units used in aviation and aeronautics.
- Understand the differences between morals and ethics.
- Appreciate the established ethical practices and codes of conduct that apply to how engineers perform their duties.
- Become familiar with the American Institute of Aeronautics (AIAA) Code of Ethics, which all professional aerospace engineers in the U.S. subscribe to.
- Be aware of copyright issues about engineering work products and what can or cannot be done under copyright law.
- Understand the implications of the DMCA regarding copyright matters that may affect an engineer's actions, including downloading or uploading different types of digital media, such as reports, technical papers, images, photographs, and software.

IAFV: 03 Design Aspects of Flight Vehicles

- Recognize different types of wings, tails, undercarriages, and other design elements that influence aircraft performance and aerodynamics.
- Develop a basic understanding of spacecraft, including multi-stage rockets, spaceplanes, satellites, and crewed vehicles, and their specialized functions in space exploration and operations.
- Appreciate the history and evolution of aerospace flight structures.
- Understand the primary loads on an airframe, such as tension, compression, bending, torsion, and shear.
- Know how aircraft structures are constructed, including spars, ribs, stringers, skin, etc.

- Understand the principles behind the finite element method (FEM) and why it is used in designing structurally efficient aerospace structures.
- Be aware of some of the challenges in airframe design, including avoiding buckling and fatigue and incorporating structural redundancy.
- Learn the factors involved in selecting materials for aerospace applications.
- Appreciate that different materials have different stiffnesses and failure levels.
- Recognize some of the advantages and disadvantages of composite materials for constructing aerospace structures.
- Learn about future aerospace materials and production technologies such as 3D printing.
- Identify the key components of an airplane, including the fuselage, wings, tail, control surfaces, powerplant(s), and undercarriage, and understand their functions in flight.
- Learn how primary (ailerons, elevator, rudder) and secondary (flaps, slats, etc.) flight controls affect an airplane's flight.
- Understand how lift, weight (gravity), thrust, and drag interact to govern an aircraft's flight characteristics.
- Identify and categorize various aircraft types within the aviation spectrum, including commercial airliners, general aviation aircraft, military aircraft, rotorcraft, unpowered aircraft, lighter-than-air vehicles, and unoccupied or uncrewed aerial systems (UAS).
- Understand the roles and responsibilities of key aviation regulatory bodies, including the Federal Aviation Administration (FAA) in the United States and the International Civil Aviation Organization (ICAO) globally.
- Find out about the U.S. Federal Aviation Regulations (FARs) and European Aviation Safety Agency (EASA) regulations, including their scope, purpose, and impact on aircraft design, certification, and operations.
- Understand the various requirements, documentation, and certification processes necessary to ensure a civil aircraft's airworthiness, including compliance with regulatory safety and maintenance standards.

IAFV: 08 Airfoil & Wing Aerodynamics

- Appreciate the historical evolution of airfoil sections for aircraft applications.
- Identify and explain the significance of the critical geometric parameters that define the shape of an airfoil.
- Know how to construct a NACA airfoil profile geometrically using a camberline shape, thickness envelope, and nose radius.

- Understand the differences in the shapes between subsonic, transonic, and supersonic airfoil sections.
- Be aware of the various definitions of aerodynamic forces and moments, as well as lift coefficient, drag coefficient, lift-curve slope, maximum lift coefficient, aerodynamic center, and center of pressure.
- Appreciate the effects of flaps and other high-lift devices on airfoil performance.
- Understand how to calculate the lift and other integrated quantities from the pressure and shear stress distributions about an airfoil.
- Know about the aerodynamic characteristics of airfoil sections, both in attached flow and with flow separation, and how these characteristics change at different Reynolds and Mach numbers.
- Know the critical geometric parameters used to define the shape of a wing.
- Be able to calculate the wing area and aspect ratio of an arbitrary wing planform.
- Understand the significance and use of mean wing chords.
- Gain an appreciation of winglets and how they work.
- Appreciate the physical nature and effects of the trailed wake system behind a wing of finite span.
- Understand the essential aerodynamic characteristics of finite wings, including the effects of wing aspect ratio on lift and drag.
- Know how to interpret and use a drag polar for a finite wing and an airplane.

IAFV: 10 Basis of Airplane Performance

- Know about the terminology and conventions used to describe the motion of an airplane, including its pitch, roll, and yaw.
- Set up the equations for the forces on an airplane following a general flight path and when undergoing basic maneuvers.
- Understand the meaning and significance of an airplane's load factor and calculate the load factors in steady turns and pull-up maneuvers.
- Appreciate the significance of a maneuvering envelope in terms of limiting airspeeds and allowable load factors.
- Distinguish between the basic engine types used to power flight vehicles.
- Learn to distinguish the fundamental differences between air-breathing engines, such as piston engines, turbojets, turbofans, and turboprop engines.
- Understand the basic physical principles of thrust production from air-breathing and rocket engines.

- Know how to determine the efficiency of a propulsive system in terms of specific fuel consumption and specific impulse.
- Understand the aerodynamic principles associated with airspeed measurement.
- Know the difference between indicated, equivalent, calibrated, and true airspeeds.
- Be able to calculate the true airspeed of an aircraft.
- Know how to calculate airspeed at higher Mach numbers.
- Learning about new approaches to airspeed measurement using optical methods.
- Understand how an altimeter works and how to read one.
- Appreciate the principles associated with altitude measurement.
- Know the differences between pressure altitude and density altitude.
- Be able to calculate density altitude from values of temperature and pressure altitude.

IAFV: 11 Propulsion Systems

- Understand the basic principles of operation of a reciprocating piston engine, mainly as it is used for aviation applications.
- Appreciate the factors that affect the shaft power that can be developed from such an engine, and know how to read an aircraft piston engine performance chart.
- Have an appreciation of the historical developments of propeller technology from the days of the Wright brothers to the present.
- Understand the basic operational principles of a propeller, including the methods used to calculate its thrust, the power required, and its efficiency.
- Be familiar with momentum theory and blade element theory when calculating the performance of a propeller.
- Know how to read and interpret a propeller performance chart.
- Understand the operational advantages of variable-pitch propellers compared to fixed-pitch designs.
- Know how to select a propeller to meet a performance requirement.
- Appreciate the differences between propellers and propellers.
- Know about a turbojet engine's essential components and characteristics, and how it works.
- Understand the essential characteristics of a turbojet engine in terms of its thrust production and specific fuel consumption as a function of flight Mach number and operational altitude.
- Appreciate the technique of "afterburning" in a turbojet engine and the various trades in using afterburning engines on an aircraft.

- Know what a ramjet engine is and how it works.
- Appreciate the concept of bypass ratio for a turbofan and how it contributes to its overall propulsive efficiency.
- Understand the characteristics of turboprop and turboshaft engines.
- Understand the basic principles of rocket propulsion systems.
- Distinguish the different types of rocket engines and their purpose.
- Appreciate the concept of impulse and specific impulse as measures of rocket efficiency.
- Know how to calculate the thrust of a rocket engine.
- Be aware of the factors that affect the performance and efficiency of rocket motors.
- Understand the functionality and characteristics of a turbofan engine and how it differs from a turbojet engine.

IAFV: 13 Faster, Higher, & Into Space

- Become familiar with the design features of supersonic airplanes and why such airplanes should have thin, highly swept, or delta-type wings.
- Better understand the effects of Mach number on the formation of shock waves and the aerodynamic efficiency of wings in supersonic flight.
- Know how to calculate the aerodynamic coefficients on supersonic airfoils and wings.
- Understand the differences between swept wings with subsonic and supersonic leading edges.
- Understand the principle of vortex lift creation on slender delta wings at high angles of attack.
- Appreciate some of the challenges in the engineering and operations of a supersonic transport airplane (SST).
- Understand the additional technical challenges for aircraft flying at hypersonic speeds.
- Know how to calculate aerodynamic coefficients on bodies in hypersonic flow.
- Appreciate the types of rockets and launch vehicles and their applications to space missions.
- Know how to derive and use the rocket equation to solve simple problems, such as determining burnout velocities.
- Understand the staging process and its use for launch vehicles.
- Know about missiles and the ballistics of projectiles.
- Appreciate the challenges of humankind reaching into space.
- Learn about the history of astronomy and the planets.

- Understand the fundamental laws of satellite motion and spaceflight dynamics.
- Be able to distinguish between different types of orbits.
- Use Kepler's equations to predict the motion of a satellite.
- Know how to transfer spacecraft between orbits.
- Understand the challenges of interplanetary travel, such as a mission to Mars.

IAFV: 15 Other Types of Flight Vehicles

- Review the developmental technical history of ground-effect vehicles (GEVs) such as hovercraft and wing-in ground-effect (WIGE) vehicles.
- Learn about the anatomy and unique design features of such ground-effect vehicles and how they work.
- Study the basic aerodynamic theory behind lift production on hovercraft and other ground-effect vehicles.
- Appreciate the valuable performance characteristics of GEVs and their limitations.
- Understand some of the capabilities and limitations of battery technology.
- Appreciate the significance of the energy-to-weight ratio for an electric aircraft.
- Know what an eVTOL aircraft is and why they are being pursued for urban aerial mobility (UAM).
- Understand the benefits and challenges of developing electrically powered aircraft.
- Be aware of the significance of greenhouse gas emissions and "carbon footprint."
- Know the meaning of the "energy density" of batteries.
- Appreciate some of the performance and weight tradeoffs of electrically-powered aircraft.
- Learn about the history of gliding and soaring.
- Be aware of the anatomy of sailplanes and their design requirements.
- Know about sailplane aerodynamics, including the need for a high lift-to-drag ratio and minimum sink values.
- Understand what is meant by laminar flow airfoil sections and appreciate their unique aerodynamic characteristics.
- Know the history and challenges of developing a successful helicopter compared to an airplane.
- Better understand the factors that affect the hovering, climbing, and descending flight performance of helicopters and other rotating-wing aircraft.
- Understand the essential performance characteristics in forward flight and the potential aerodynamic limitations.

- Appreciate how a helicopter is controlled during flight, including using blade hinges and cyclic blade pitch.
- Know about other types of VTOL aircraft and their capabilities and limitations.
- Learn about the history of autogiros and gyroplanes and how they helped shape the development of rotating-wing aviation.
- Understand the principles of autorotation and how autogiros generate lift without engine-driven rotors.
- Appreciate the performance differences between autogiros and helicopters, and why helicopters eclipsed their flight capabilities.
- Appreciate how the future development of autogiros and gyroplanes may still help expand the scope of aviation.
- Know about the history of balloons, airships, and other aerostats.
- Understand the principles of buoyancy and aerostatic lift.
- Appreciate the aerodynamic performance characteristics of airships.
- Understand how an airship is controlled during flight using buoyancy and propulsion.
- Be aware of the stability, handling qualities, and unique flight characteristics of airships.

Introduction to Geographic Information Systems

Intro to GIS: 02 Data and Information

- Compare primary and secondary data sources and determine the importance of metadata and data standards.
- Describe data and information and how it is organized into files for use in a geographic information system.
- Identify and evaluate key considerations when searching for spatial and nonspatial data.

Intro to GIS: 03 Cartographic Principles

- Describe the properties of color and how best to utilize them in cartography.
- Determine how best to utilize point, line, and polygon symbols to assist in the interpretation of your map and its features.
- Compare fundamental cartographic principles that contribute to effective map design.
- Analyze how critical cartography and GIS are a set of mapping practices and lenses of analyzing how maps reflect and perpetuate relations of power, typically in favor of a society's dominant group.

Intro to GIS: 04 Representing Earth

- Define what a map is and to describe reference, thematic, and dynamic maps.
- Describe the concepts of map scale, coordinate systems, and map projections and how they are central to map-making.
- Explain the decision-making process behind maps and to underscore the need to be explicit and consistent when creating maps.

Intro to GIS: 05 GIS Data Models

- Determine how vector and raster data models, satellite imagery, and aerial photography are implemented in GIS applications.
- Describe the concepts and terms related to the variety of single-overlay analysis techniques available to analyze and manipulate the spatial attributes of the vector feature dataset.
- Describe the concepts and terms related to the implementation of basic multiple-layer operations and methodologies used on vector feature datasets.
- Apply basic raster surface analyses to terrain mapping applications.
- Explain basic-single and multiple raster geoprocessing techniques.
- Describe how local, neighborhood, zonal, and global analyses can be applied to raster datasets.
- Understand the concepts and terms related to GIS surfaces, how to create them, and how they are used to answer specific spatial questions.

Intro to GIS: 01 Introduction to Geographic Information Systems

- Illustrate how we think geographically and spatially every day with mental maps to highlight the importance of asking geographic questions.
- Explain how the key concepts of scale, location, direction, distance, space, and navigation are relevant to geography and geographic information systems.
- Define how a geographic information system is applied, its development, and its future.

Space Systems: Emerging Technologies and Operations

Space Systems: ET&O: SECTION 01: C4ISR AND EMERGING SPACE TECHNOLOGIES

- Distinguish between space domain, space technologies, and space operations
- Understand technological development priorities
- Understand the concept and importance of satellite technology
- Explain various orbits and their significance
- Introduce and integrate fundamental space operations terminology

- Understand threat deterrence and first strike capabilities in warfare
- Understand satellite countermeasures
- Understand satellite platforms for deployment of hypersonic weapons
- Know key definitions in EW, satellite systems, and ECD countermeasures
- Identify space calculations and satellite threats using plane and spherical trigonometry to explain orbital mechanics
- Understand EMS, signals, RADAR, Acoustic, and UAS Stealth principles
- Understand signals to/from satellites and their vulnerabilities to Interception, Jamming, and Spoofing
- Understand the promising ECD technology countermeasure to spoofing can detect, mitigate, and recover fake and genuine signals
- Understand the potential of manufacturing in space, on Earth and on the International Space Station (ISS)
- Understand the potential of manufacturing replacement parts in space, recycling in space, printing spacecraft and use of resources on planetary surfaces.
- Understand the difference between circular economics and sustainability and the need for manufacturing in space as an application of circular economic principles.
- Identify the history and historical relationships of space operations

Space Systems: ET&O: SECTION 02: SPACE CHALLENGES AND OPERATIONS

- Understand security and risk management issues involving the protection and safeguarding of critical infrastructures from space-based threats as well as expected future challenges
- Understand the problem of trash in space, including its history, exploring how space junk is located and tracked
- Explore the benefits of space disaster risk reduction and management during a global pandemic.
- Understand the impact of space disaster risk reduction and management in preventing climate change
- Further understand the advances in space can lead to greater quality of life on Earth.
- Recognize how recent advancements in virtual, augmented, and extended reality technologies have created new and exciting frameworks in the areas of simulation, modeling, and training
- Understand immersive technology and surrounding use cases in emerging space systems

- Understand common bioterrorism definitions, animal diseases, human diseases, and zoonoses.
- Recognize that biological attacks on agriculture can be low-tech, high-impact bioterrorism.
- Identify five potential targets of agricultural bioterrorism
- Describe two ways remote sensing can be used to identify agricultural threats to crops.
- Understand how satellite observations predict vulnerable targets conducive to plants and livestock
- Understand the nature of critical infrastructure and its various subsystem elements today
- Understand the impact of space-based platforms and technology on critical infrastructures
- Understand the significance of selected space related technologies on the operational integrity of critical infrastructures and their relevant cyber vulnerabilities
- Understand potential threat indicators related to space-based platforms after 2023

Space Systems: ET&O: SECTION 03: HUMANITARIAN USE OF SPACE TECHNOLOGIES

- Understand the concepts and framework related to the current and future uses of space assets and autonomous systems in the agriculture industry
- Define cislunar space
- Describe how satellites are used for a variety of civilian uses
- Understand how space technologies are being used to improve global food supply and cattle management

Pointful Education

Drones: Remote Pilot Certification

DRONES 00: Module 0 - Start Here

- Completion

DRONES 01: Introduction to the Drone Remote Pilot Exam

- Describe personal and commercial uses of drones as well as potential careers in the drone industry
- Define key terms related to drones
- Outline the structure and topics covered in the remote pilot exam
- Identify where to take a remote pilot exam and locate their nearest testing center

- List the eligibility requirements to take the knowledge test
- Discuss the importance of flying legally, following rules, and safety
- Describe the steps to register a drone as well as the penalties for failing to register
- Evaluate whether drone insurance is necessary and describe the cost and coverage of drone insurance

DRONES 02: Regulations Part 1

- Evaluate the necessity of regulations for the FAA and their benefits.
- Define the eligibility requirements and pertinent terms to the Part 107 remote pilot.
- Discuss the roles of the remote pilot and supporting crew.
- Analyze the necessity of a penalty for falsification, reproduction, or fraudulent reproduction of certificates, reports, logbooks, or records as well as accident reporting.
- Understand the documentation required for FAA inspections, sUAS registration, and pre-flight action and inspection.

DRONES 03: Regulations Part 2

- Analyze the importance of understanding the requirements surrounding hazardous material carriage and daylight operation.
- Identify the rules and requirements associated with visual line of sight and right of way.
- Discuss the rules surrounding operation over people, change of address requirements, and operation from moving vehicles or an aircraft.
- Discuss the importance of privacy and safety operations when operating a drone.
- Understand the laws and rules surrounding alcohol and drugs associated with operating a drone.

DRONES 04: National Airspace System

- Identify the various airspace resources.
- Compare and contrast the various airspace classifications, areas, and routes.
- Use longitude and latitude to find a specific point on the globe.
- Understand the requirements surrounding airport operations.
- Identify airport markings and signs.

DRONES 05: Weather

- Employ active collision avoidance procedures.
- Understand the ramifications of wind, air masses, and fronts.
- Analyze atmospheric stability, visibility, and clouds.
- Evaluate the impact of thunderstorms, icing, and fog to operating a drone.

- Use weather briefings, reports, forecasts, and charts to plan drone piloting.

DRONES 06: Loading & Performance

- Determine speed and altitude and follow regulations surrounding them.
- Understand the loading requirements for drones.
- Identify the load factor requirements for an unmanned aircraft.
- Discuss stalls in an unmanned aircraft.
- Argue the importance of understanding the performance or operational information provided by the manufacturer of a specific drone.

DRONES 07: Operations

- Understand the requirements for a pre-flight inspection.
- Use appropriate pre-flight and in-flight communication procedures.
- Identify appropriate in-flight emergency procedures.
- Use aeronautical decision-making strategies.
- Analyze maintenance and inspection procedures.

DRONES 08: Drone Careers

- Understand the requirements and responsibilities associated with becoming a drone instructor.
- Understand the requirements and responsibilities associated with becoming a drone pilot.
- Discuss the requirements and responsibilities associated with becoming a drone photographer.
- Identify the requirements and responsibilities associated with drone operation in the military.
- Evaluate the requirements and responsibilities associated with becoming a drone technician.

DRONES 09: Course Wrap-up / Final Exam

- Completion

Robotics Applications and Careers

ROBO 00: Robotics Applications and Careers

- Completion

ROBO 01: What is a Robot?

- Summarize the history of robot development
- Define key concepts in robotics (e.g., artificial intelligence, algorithm, machine learning, deep learning, and neural networks) and explain how robots relate to artificial intelligence
- Examine the Three Laws of Robotics and the Turning Test
- Identify potential risks associated with the rise of robots and AI
- Describe what a robot is and explain the differences between robots and other machines
- Identify career opportunities in robotics and educational paths to enter those careers

ROBO 02: Robots in Factories

- Determine the impact of robots on jobs in manufacturing
- Compare the benefits and limitations of utilizing robots and artificial intelligence in manufacturing
- Identify potential career opportunities in manufacturing robotics
- Explain the Luddite uprising in England in 1812 and describe how it demonstrates peoples' reaction to technological change
- Describe the use and growth of robots in factories and manufacturing

ROBO 03: Robots in Healthcare

- Evaluate various use cases of robotics in healthcare, including: diagnostics, robotic surgery, early disease/cancer detection, and DNA-specific drugs
- Discuss how robots could be a component of caring for elderly populations
- Compare the benefits and limitations of utilizing robots and artificial intelligence in healthcare
- Determine the impact of robots on jobs in the medical field
- Identify potential career opportunities in healthcare robotics

ROBO 04: Robots on the Farm

- Describe the change in agriculture employment from 1900 to today and the causes of the change
- Evaluate various use cases of robotics and artificial intelligence in farming
- Discuss how precision application of fertilizer and other robotic innovations allow for environmental benefits
- Determine the impact of robots on jobs in the agriculture industry

- Compare the benefits and limitations of utilizing robots and artificial intelligence in agriculture

ROBO 05: Robots at Home

- Evaluate various use cases of robotics and artificial intelligence used in home applications
- Describe components and technologies that contribute to robots used in the home
- Describe elements of robotics or artificial intelligence that are in smartphones and personal assistants
- Compare the benefits and limitations of utilizing robots and artificial intelligence in the home
- Examine the concept of the Uncanny Valley and how engineers and roboticists approach this issue

ROBO 06: Robots that Play Games

- Define key terms related to game-playing robots
- Evaluate various use cases of robotics playing board games, video games, and physical games (sports)
- Compare the benefits and limitations of utilizing robots and artificial intelligence in games
- Discuss the impact that the success of gaming robots has had on society
- Examine how the success of combining human and robot teams could translate into other fields
- Identify potential career opportunities in gaming robotics

ROBO 07: Robots that Drive

- Identify key technologies that enable self-driving cars
- Define algorithm and explain how algorithms allow self-driving cars to operate
- Compare the benefits and limitations of utilizing robots and artificial intelligence in transportation
- Evaluate changes in elevator operator jobs and describe how it demonstrates peoples' reaction to change in transportation technology and automation
- Determine the impact of robots on jobs in transportation
- Identify career opportunities in self-driving cars and educational paths to enter those careers

ROBO 08: Robots at School

- Evaluate various uses of robotics used in education
- Describe how robots are used to assist children with disabilities
- Compare the benefits and limitations of utilizing robots and artificial intelligence in education
- Discuss the impact that robots may have on the teaching profession
- Identify career opportunities in educational robotics and describe how teachers and students can utilize robotics and AI to achieve positive educational outcomes

ROBO 09: Robots with Global Impact

- Identify the current and potential near-term uses of robots and artificial intelligence in war
- Determine the impact of robots on jobs in the military
- Evaluate various use cases of robotics used in outer space
- Compare the benefits and limitations of utilizing robots and artificial intelligence in space
- Identify key contributors to development of robotics in this the military and space
- Discuss the ethics of using robots and artificial intelligence in war

ROBO 10: Singularity

- Define exponential growth and compare it to linear growth
- Describe Moore's law and how it is used to predict singularity
- Explain technological singularity
- Evaluate contributions made by key scientists and writers on the subject of singularity, including: John Von Neumann, Vernor Vinge, Ray Kurzweil, and Stephen Hawking
- Compare arguments made about singularity, including "will it happen" and "should it happen"
- Predict when (if ever) singularity will occur and support argument
- Hypothesize on the future progress of robotics

ROBO 11: Course Wrap-up/Final Exam

- Completion

The History of Gaming and eSports

HGE 00: Start Here

- Completion

HGE 01: Atari and the Introduction to Video Games

- Examine the gameplay features of key Atari games like Pong, Space Invaders, PacMan, and E.T.
- Discuss the cultural impact of Atari
- Identify the arcade as a precursor to social gaming
- Describe how the concept of a high score increased game engagement and appeal
- Define keywords related to the Atari
- Describe how the level of technology available at the time impacted the development of the Atari game system

HGE 02: Nintendo and Game Boy

- Describe the unique gameplay features and Genres that were pioneered by key NES games like Super Mario Brothers, Zelda, Final Fantasy, and Tecmo Super Bowl
- Identify the impact of the Game Boy on the future of mobile gaming
- Examine the intellectual property and copyright battles regarding the game of Tetris
- Discuss the lasting cultural impact of Mario Brothers
- Identify career opportunities as a video game designer and educational paths to enter those careers
- Define the key technologies that Nintendo used to create their original NES system and Game Boy

HGE 03: Super Nintendo, Sega, and Computer Games

- Define the key technologies used in the Super NES and Sega systems and how the technology enabled new features in gameplay
- Identify various game genres that were furthered in the era of Super Nintendo (racing, RPG, sports, action) and define the key characteristics of these genres
- Discuss the rivalry between Nintendo and Sega
- Describe early computer-based games and how these compared to console-based games
- Identify career opportunities as video game tester and educational paths to enter those careers

HGE 04: PlayStation

- Identify career opportunities as a video game writer or artist and educational paths to enter those careers

- Define the key technologies used in the PlayStation and Nintendo N64 systems and how the technology enabled new features in gameplay
- Evaluate the business decisions for Sony to enter the video game market
- Describe the introduction and development of first-person shooter games
- Examine the impact of ESRB ratings on the video game industry and compare the ESRB with other global rating systems

HGE 05: Xbox

- Describe the developments in technology and gameplay of successive generations of Xbox consoles
- Evaluate the business model of console and cartridge (network effects, razor/razorblade, pricing, etc.)
- Examine the rivalry between Sony and Microsoft
- Identify career opportunities as a video game programmer and educational paths to enter those careers
- Discuss the importance of networked gaming and how services like Xbox Live changed the gaming experience

HGE 06: Wii, Kinect and Active Gaming

- Compare and contrast the Nintendo Wii to the other existing consoles and gaming platforms at the time it was released
- Describe the Kinect and list reasons why it failed to live up to its initial expectations
- Examine key active gaming titles such as Dance Dance Revolution, Wii Sports, and others
- Evaluate the cultural impact of Guitar Hero
- Discuss the importance of physical activity and the health risks of an inactive lifestyle

HGE 07: Mobile Games

- Evaluate the gameplay and genres of the most popular mobile games
- Describe the features and market positioning of the Nintendo Switch
- Define the characteristics of a good mobile game (short, addicting, achievement, badges)
- Explain the freemium business model and discuss in-game purchases
- Describe gamification and how game principles are used outside of gaming for motivation and engagement

- Identify potential career opportunities within game app development and educational paths to enter those careers

HGE 08: Augmented and Virtual Reality Gaming

- Define key terms related to AR/VR in gaming
- Describe the historical attempts at bringing virtual reality to gaming
- Evaluate the platforms, features, and genres of AR gaming
- Evaluate the platforms, features, and genres of VR gaming
- Compare the pros and cons of AR/VR gaming to traditional gaming
- Identify potential career opportunities within AR/VR game development and educational paths to enter those careers

HGE 09: History and Current State of E-sports

- Describe the origin and key historical development of e-sports
- Evaluate the current scope and size of the e-sports industry
- Identify potential career opportunities within E-sports and skills required to work in the E-sports industry
- Describe participants in the E-sports ecosystem
- Examine factors that make successful E-sport games

HGE 10: Contemporary Issues in E-sports

- Describe E-sports and compare what makes them different from typical video games
- Describe major e-sports titles, genres and gameplay features
- Define skills required to succeed as an E-sports athlete
- Identify high school and college programs and scholarships available within E-sports
- Discuss whether E-sports are "real sports" or not and if should they be recognized as Olympic games
- Evaluate the culture and community within E-sports, including toxicity and gender balance

HGE 11: Course Wrap-up / Final Exam

- Completion

STEM Advancement Inc.

Introduction to STEM

Introduction to STEM 1: Defining Engineering

- Define Engineering as Problem Solving
- Identify 4 Main Categories of Engineering
- Understands STEM Majors

Introduction to STEM 2: Engineering Design Process and Keeping a Log Book

- Understanding the EDP
- Importance of the engineering logbook

Introduction to STEM 3: 3D Design and Design Thinking

- Understanding Tinkercad
- Understanding the use of the EDP

uniteSTEM Academy

TSA DRONE Competition: How To Build Your Drone

Welcome to the TSA DRONE Challenge

- Design, build, assemble, document, and test fly an open source Unmanned Aerial Vehicle (UAV) drone
- Complete maneuvering and dropping tasks of varying difficulty in a course
- Test the handling, maneuverability, hardware capabilities, and piloting of your drone

Xennial Digital

VR Dissections

Dissections

- Identify and describe the internal and external structures of an earthworm
- Understand organ systems
- Understand the major systems and organs of an earthworm, such as the digestive, circulatory, reproductive, and nervous systems
- Understand how systems work together
- Learn the internal and external anatomy of a clam, including the shell, gills, foot, mantle, and visceral mass

- Learn the function of each part of the clam
- Learn the clam's classification as a bivalve mollusk, which means it has two shells
- Learn anatomical terms used to describe the clam
- Learn how to dissect a clam and use a scalpel
- Learn how to handle a preserved clam safely, such as by wearing gloves and safety glasses
- Learn the anatomy of a crayfish, including the location of major organs and the appearance of different organs
- Gain a better understanding of the anatomy of invertebrate animals in general
- Learn about the behavior and structures of a crayfish
- Learn how to follow a complex multistep procedure
- Understand fish anatomy
- Understand the internal and external anatomy of fish, including the organs and systems
- Develop observation skills
- Make inferences
- Understand the function of organs
- Understand how the organs and systems of a fish work together
- Identify major anatomical structures of the frog (e.g., heart, lungs, liver, stomach, intestines, muscles, and bones).
- Understand the function of each organ and how they work together in the frog's body systems (e.g., circulatory, respiratory, digestive, and nervous systems).
- Relate the structure of each organ or system to its function, emphasizing the NGSS crosscutting concept of structure and function
- Develop skills in scientific observation, dissection techniques, and accurate labeling of anatomical diagrams
- Use tools such as scissors, scalpels, and forceps safely and effectively
- Make observations and ask questions about the frog's anatomy and its ecological role
- Understand how the frog's organ systems interact to support life processes such as respiration, digestion, and circulation

Transportation, Distribution & Logistics

Open Textbooks

Global Value Chain

GVC01: Introduction to Global Value Chain

- Define the term value chain, global value chain and outline its components
- Highlight the importance of international trade process, stakeholders and documents in understanding the concept of global value chain
- Examine the relationship between global value chain and global supply chain management

GVC02: Distribution Logistics

- Analyze the role of distribution logistics in value chain.
- Explain the terms Inbound and Outbound Logistics and their components
- Outline the steps in the logistics cycle
- Assess the role of logistics service providers in this cycle

GVC03: International Procurement

- Explain the concept of procurement and how it adds value in the global value chain
- Introduce the concepts of Sourcing and Outsourcing of Goods, Manufacturing and Services
- Show how Suppliers are selected and the role of different components in supplier relationship models
- Explain how supplier relationships adds value in global value chain

GVC04: Transportation

- Identify different modes of transportation and their characteristics
- Assess infrastructure and equipment types used in different modes of transportation
- Describe International Transport Network
- Explain how transportation adds value to the global value chain

GVC05: Inbound and Outbound Storage Facilities

- Explain the importance of storage in Global Value Chain and the concept of Inbound and Outbound Storage
- Offer Insights on how warehouses help in storage and role of technology in it

- Discuss the importance of demand planning and Inventory Management in value chain
- Describe inventory control systems and strategies used for ensuring optimal inventory levels

GVC06: Facilitating International Freight Flows

- Describe the International Chamber of Commerce (ICC) Incoterms.
- Explain different ways to facilitate and promote trade
- Introduce Harmonized commodity classification system and its use in international trade

GVC07: Value Chain Vulnerability

- explain the concept of value chain vulnerability by reviewing current challenges
- Identify types of risks and disruptions
- Examine risk management strategies to mitigate the supply chain vulnerability

GVC08: Sustainable Value Chains

- Define the term Sustainable Value Chain and how it adds value in the global value chain
- Explain the concept of Circular Economy
- Describe various initiatives taken by organizations to make their supply chains sustainable
- Learn the main dimensions of sustainability in the global value chain
- Identify key sustainability challenges in value chains and recommend solutions

GVC09: Emerging Value Chain Concepts

- Explain the concept of Reverse Logistics
- Define how ICT is supporting the global value chain
- Explain the concept of Value Stream Mapping
- Explain humanitarian supply chain management, identify issues, and define recommendations and the practical implications

Introduction to Logistics

Introduction to Logistics

- Develop risk management strategies to assess major risks and challenges for logistics in a supply chain.
- Understand how to look up the rules pertaining to air cargo.
- Identify risks and current challenges that supply chain logistics face.
- explore potential risks and future challenges that supply chains logistics might face.

- Understand the rules surrounding the hours of service in the trucking industry.
- Explain the role of logistics in supply chains.
- List the factors considered when designing the logistics in a supply chain.
- Explain the elements that make up a logistics network.
- Examine the importance of logistics to the economy.
- Review supply chain professional organizations and associations.
- Describe the impact of information technology on Logistics management.
- Understand the role of technology in Logistics planning, and security
- Recognize the changing Logistics Landscape due to the evolvement of technology applications in transportation.
- Identify the cost for over-the-road moves
- Understand how variable and fixed costs are applied in transportation
- Identify the different modes of transportation.
- Evaluate the characteristics, advantages and disadvantages of different transportation modes.
- Assess the infrastructure and equipment types used in different modes of transportation.
- Describe the considerations for packaging products
- Compare the uses of different types of warehouses
- Examine the role warehouses and distribution centers play in the supply chain
- Describe the type of equipment used to load and unload products.
- Understand the structure of logistics providers from 1 PL to 4 PL.
- Identify the types of logistic providers.
- Understand why companies outsource logistics services.
- Explain the key transportation processes involved in the global supply chain.
- Understand the difference between multimodal and intermodal transportation.
- Explain Incoterms.
- Understand who governs OTR transportation in Ontario.

Procurement in the Supply Chain World

Procurement in the Supply Chain World

- Perform a cost analysis to determine if the price offered by the supplier is fair and reasonable
- Calculate the Total Cost of Ownership to compare different suppliers' pricing.
- Consider the Learning Curve when evaluating supplier pricing.

- Understand discounts that may be applicable to supplier pricing.
- Explain why companies outsource.
- Describe the reasons why the use of outsourcing and offshoring has grown.
- Explain some drawbacks companies face when they outsource their activities.
- Understand that choosing whether to make or to buy a product or choosing to have services performed by an outside company, are outsourcing decisions.
- Compare costs to keep the product or service in-house to the cost of buying the product or service from an outside party.
- Explain the need for identifying and evaluating global suppliers.
- Outline the advantages of global sourcing.
- Know the pros and cons of sole-sourcing and multisourcing.
- Know how to source successfully internationally.
- Understand the impact Trade Agreements have on sourcing internationally.
- Understand what ethics are and how they apply to procurement.
- Compare the risks to individuals and organizations of unethical behaviour.
- Analyze different types of unethical behaviour in purchasing.
- Evaluate how to promote ethical behaviour in the workforce.
- Establish corporate social responsibility and sustainable procurement practices.
- Discuss the various sources of procurement information systems.
- Understand the benefits of technology in procurement.
- recognize the role of procurement in the enterprise resource planning (ERP) process.
- Understand key procurement objectives
- Analyze the key procurement procedures and processes
- Evaluate the key steps carried out in managing the procurement process.
- Understand portfolio analyses and their use in developing procurement strategies.
- Explain the commodity strategy development process and the key steps in that process.
- Apply the procurement of goods and services based on their relative strategic importance.
- Analyze the various procurement strategies used to achieve competitive advantage.
- Evaluate current and evolving strategies in the procurement field
- Discuss the various sources of market intelligence.
- Recognize the use of market intelligence in identifying potential suppliers
- Understand key supplier evaluation practices
- Explain the need for identifying and evaluating global suppliers.
- Understand the key aspects of procurement contract execution.

- Implement the various forms of procurement enablers.
- Analyze the key forms of documentation used in procurement.
- Evaluate key aspects of managing the procurement process and managing the internal processes involved in procuring goods and services.
- Explain what can be measured in terms of Supplier Performance.
- Apply different types of supplier performance evaluation techniques.
- Understand why and how to optimize the supply base.
- Apply a supplier development process
- Understand how to maintain relationships with suppliers.
- Apply different methods of price analysis to determine if the price offered by the supplier is fair and reasonable.
- Explain procurement roles and activities.
- Define procurement and its purpose

Pointful Education

Drones: Remote Pilot Certification

DRONES 00: Module 0 - Start Here

- Completion

DRONES 01: Introduction to the Drone Remote Pilot Exam

- Describe personal and commercial uses of drones as well as potential careers in the drone industry
- Define key terms related to drones
- Outline the structure and topics covered in the remote pilot exam
- Identify where to take a remote pilot exam and locate their nearest testing center
- List the eligibility requirements to take the knowledge test
- Discuss the importance of flying legally, following rules, and safety
- Describe the steps to register a drone as well as the penalties for failing to register
- Evaluate whether drone insurance is necessary and describe the cost and coverage of drone insurance

DRONES 02: Regulations Part 1

- Evaluate the necessity of regulations for the FAA and their benefits.
- Define the eligibility requirements and pertinent terms to the Part 107 remote pilot.
- Discuss the roles of the remote pilot and supporting crew.

- Analyze the necessity of a penalty for falsification, reproduction, or fraudulent reproduction of certificates, reports, logbooks, or records as well as accident reporting.
- Understand the documentation required for FAA inspections, sUAS registration, and pre-flight action and inspection.

DRONES 03: Regulations Part 2

- Analyze the importance of understanding the requirements surrounding hazardous material carriage and daylight operation.
- Identify the rules and requirements associated with visual line of sight and right of way.
- Discuss the rules surrounding operation over people, change of address requirements, and operation from moving vehicles or an aircraft.
- Discuss the importance of privacy and safety operations when operating a drone.
- Understand the laws and rules surrounding alcohol and drugs associated with operating a drone.

DRONES 04: National Airspace System

- Identify the various airspace resources.
- Compare and contrast the various airspace classifications, areas, and routes.
- Use longitude and latitude to find a specific point on the globe.
- Understand the requirements surrounding airport operations.
- Identify airport markings and signs.

DRONES 05: Weather

- Employ active collision avoidance procedures.
- Understand the ramifications of wind, air masses, and fronts.
- Analyze atmospheric stability, visibility, and clouds.
- Evaluate the impact of thunderstorms, icing, and fog to operating a drone.
- Use weather briefings, reports, forecasts, and charts to plan drone piloting.

DRONES 06: Loading & Performance

- Determine speed and altitude and follow regulations surrounding them.
- Understand the loading requirements for drones.
- Identify the load factor requirements for an unmanned aircraft.
- Discuss stalls in an unmanned aircraft.
- Argue the importance of understanding the performance or operational information provided by the manufacturer of a specific drone.

DRONES 07: Operations

- Understand the requirements for a pre-flight inspection.
- Use appropriate pre-flight and in-flight communication procedures.
- Identify appropriate in-flight emergency procedures.
- Use aeronautical decision-making strategies.
- Analyze maintenance and inspection procedures.

DRONES 08: Drone Careers

- Understand the requirements and responsibilities associated with becoming a drone instructor.
- Understand the requirements and responsibilities associated with becoming a drone pilot.
- Discuss the requirements and responsibilities associated with becoming a drone photographer.
- Identify the requirements and responsibilities associated with drone operation in the military.
- Evaluate the requirements and responsibilities associated with becoming a drone technician.

DRONES 09: Course Wrap-up / Final Exam

- Completion

Smart Cities: Technology and Applications

SCT 00: Start Here

- Completion

SCT 01: Introduction to Smart Cities

- Construct a timeline of the history of Smart Cities
- Identify the primary components that make up a Smart City
- Compare and contrast the differences between two Smart Cities
- Evaluate the typical cost of a smart city based on population
- Analyze the environmental impacts of a Smart City

SCT 02: Smart Energy

- Understand the definition and history of smart energy
- Evaluate the minimum requirements to classify a city as having smart energy
- Identify the key features of smart energy in a Smart City

- Evaluate the environmental impact of Smart Energy
- Analyze the use of smart energy across the globe

SCT 03: Smart Transportation

- Understand the definition and history of Smart Transportation
- Evaluate the minimum requirements to classify a city as having Smart Transportation
- Identify the various types of Smart Transportation
- Identify the various types of Smart Transportation
- Analyze the use of Smart Transportation across the globe

SCT 04: Smart Data

- Define Smart Data
- Evaluate the minimum requirements to classify data as Smart Data
- Identify the various components of Smart Data
- Investigate the ethical and moral concerns surrounding Smart Data
- Analyze the use of Smart Data across the globe

SCT 05: Smart Infrastructure

- Define ICT and smart infrastructure
- Evaluate the minimum requirements to classify an infrastructure as a smart infrastructure
- Identify the various components of a smart infrastructure
- Evaluate the relationship between smart infrastructure and a culture of innovation
- Analyze the use of Smart Infrastructure across the globe

SCT 06: Smart Mobility

- Define Smart Mobility
- Examine the various types of Smart Mobility
- Identify the types of Smart Mobility used in various Smart Cities
- Evaluate the environmental impact of Smart Mobility
- Analyze the community benefits to Smart Mobility in a Smart City

SCT 07: Smart Objects

- Describe the hardware, sensors, actuators, and software that make up the IoT
- Evaluate how IoT devices and applications contribute to creating smart cities
- Identify the risks associated with ransomware attacks on the IoT

- Identify career opportunities in the IoT and Smart Cities and educational paths to enter those careers
- Define key terms related to the Internet of Things (IoT)

SCT 08: Smart Government

- Describe Smart Government and eGovernance
- Describe how Smart Cities technology can improve government and better deliver services to citizens
- Analyze the potential impact on government budgets as a result of implementing Smart City technology
- Compare the enhanced security provided by Smart City technology with the decreased privacy from greater surveillance and tracking
- Examine efforts by companies and governments to address risks and concerns of the Internet of Things and Smart Cities

SCT 09: Course Wrap-up/Final Exam

- Completion

Transportation Technologies

TRANSPORT 00: Module 0 - Start Here

- Completion

TRANSPORT 01: Introduction to the Future of Transportation

- Define ubiquity and discuss adoption of previous technologies such as the telephone
- Outline the history of transportation and contrast past technological changes with current opportunities
- Match future transportation modes with their definition
- Evaluate a framework to evaluate futuristic transportation technologies
- Describe limitations with current transportation modes and how future technologies can help solve some of these problems
- Analyze the technology adoption curve and relate it to the adoption of future transportation technologies

TRANSPORT 02: Flying Cars

- Define what a Vertical Take-Off and Landing vehicle is and how it is different from existing modes of transportation

- Identify historical attempts at building flying cars and technological advances that have contributed to the emergence of flying cars
- Predict when they will ride in a flying car and justify their prediction
- Examine existing companies that develop flying cars and match a project name with each company
- Describe current prototypes and demonstrate a basic understanding of their underlying technologies
- Compare the pros and cons of flying cars on the economy, society, the environment, and safety
- Appraise future career opportunities and pathways in the flying car industry

TRANSPORT 03: Self-driving Car Technology

- Describe the 6 levels of autonomous driving
- Classify a driving feature into one of the 6 levels of autonomous driving
- Identify key technologies that enable self-driving cars
- Define algorithm and explain how algorithms allow self-driving cars to operate
- Identify career opportunities in self-driving cars and educational paths to enter those careers
- Examine technologies that enable self-driving trucks

TRANSPORT 04: Self-driving Cars in Society

- Examine the risks and costs of human operated cars
- Evaluate the risks and benefits of self-driving cars
- Discuss ethical dilemmas in driverless car engineering and operation
- Choose an aspect of society that will be impacted by self-driving cars (such as parking, traffic, accidents, jobs, mobility) and argue for or against self-driving cars
- Interview a parent, teacher, or other adult about self-driving cars and hypothesize about the acceptance of self-driving cars in society

TRANSPORT 05: Drones

- Define drones and distinguish drones from other types of aerial technology and transportation
- Describe technologies that allow drones to fly, be controlled remotely, and operate autonomously
- Determine the impact of drone delivery on jobs and the environment
- Identify how drones are used to deliver food, healthcare supplies, and packages

- Assess the safety of drone delivery
- Predict when they will receive their first package delivered by drone
- Identify career opportunities in drones and educational paths to enter those careers

TRANSPORT 06: Hyperloop

- Define key technological and engineering aspects of a vactrain
- Examine the historical development of the vactrain concept
- Debate whether Hyperloop is practical given costs and current technologies
- Discuss risks of the Hyperloop system, such as system failures or susceptibility to terrorism or natural disasters such as earthquakes
- Predict when the Hyperloop or another vactrain will be operational and open to the public
- Identify career opportunities in vactrain technology and educational paths to enter those careers

TRANSPORT 07: Jetpacks

- Describe what a jetpack is and how it is different from existing modes of transportation
- Identify technological advances that have contributed to the emergence of jetpacks
- Describe historical and current prototypes and demonstrate an understanding of their underlying technologies
- Discuss the risks involved in wearing and operating a jetpack
- Predict whether jetpacks will be used as a regular means of transportation
- Examine an existing company that develops jetpacks

TRANSPORT 08: Supersonic Jets

- Define key technological terms related to supersonic jets and airplane flight
- Differentiate between supersonic jets and regular jet airliners
- Summarize the Concorde supersonic jet program, including its technology, cost, operations, and shortcomings
- Discuss the noise problem of a sonic boom created by supersonic jets
- Identify both pros and cons of supersonic jets, including safety considerations
- Predict when supersonic jets will be used regularly for intercontinental flight
- Examine an existing company that is developing supersonic jets
- Identify career opportunities in aerospace and educational paths to enter those careers

TRANSPORT 09: Personal Rapid Transit

- Examine an existing company that is developing PRTs

- Discuss impediments to building PRTs and evaluate how PRTs' inability to gain mass adoption might impact other future transportation technologies
- Differentiate between fixed-track PRT systems and personal transportation vehicles
- Describe Personal Rapid Transit Systems (PRTs) and various forms of Podcars or personal vehicles
- Define key vocabulary words and concepts related to PRTs and podcars
- Compare PRT Systems with existing transport systems and infrastructure

TRANSPORT 10: Supercavitation

- Create a business plan for a company that utilizes supercavitation
- Define density, drag, cavitation and supercavitation
- Differentiate between vaporous and artificial cavitation
- Identify historical and future use cases for supercavitation
- Discuss problems associated with supercavitation and potential solutions
- Identify and describe other futuristic marine transportation such as autonomous and fuel-efficient ships

TRANSPORT 11: Space Travel

- Review the history of rocket use and space exploration
- Compare the benefits gained from space travel with the challenges and costs
- Define key vocab words related to rockets and space travel
- Describe the challenge of creating reusable rockets
- Examine an existing company that is developing commercial space travel
- Identify career opportunities in space travel and educational paths to enter those careers

TRANSPORT 12: Interstellar Travel

- Predict when, if ever, an interstellar voyage will be launched and justify the prediction
- Discuss feasibility of an interstellar mission given energy requirements and risks
- Identify challenges to interstellar travel based on today's technologies
- Define astronomical units, light speed, propulsion, and gravity units (G-force)
- Describe theories for interstellar travel possible
- Compare pros and cons of proposed methods to achieve interstellar travel

TRANSPORT 13: Course Wrap-up/Final Exam

- Completion

uniteSTEM Academy

TSA DRONE Competition: How To Build Your Drone

Welcome to the TSA DRONE Challenge

- Design, build, assemble, document, and test fly an open source Unmanned Aerial Vehicle (UAV) drone
- Complete maneuvering and dropping tasks of varying difficulty in a course
- Test the handling, maneuverability, hardware capabilities, and piloting of your drone

Xennial Digital

Aircraft Hanger Simulation

Cessna Simulation

- Dive deep into each career responsibilities, salaries and opportunities.
- Explore the hangar and familiarize themselves with key areas and parts of a Cessna 172 aircraft.
- Learn about each part's definition, importance, and risk of failure.
- Are quizzed about the different parts with an additional knowledge check.
- Play the role of a professional pilot to perform a full pre-flight check in preparation for a flight.
- Walk around the aircraft to complete the official checklist.
- Must identify randomized "squawks" in the aircraft, that will not allow the aircraft to pass the pre-flight inspection.
- Play the role of an aircraft technician to perform a full general visual inspection (GVI) in preparation for a flight.
- Walk around the aircraft to complete the official checklist.
- Must identify randomized "squawks" in the aircraft and choose a course of action to determine if the aircraft is allowed to fly.
- Learn about the different career opportunities in the field of aviation.
- Explore traditional and non-traditional careers in professional piloting, flight operations, and avionics, maintenance and engineering.