# Scope & Sequence

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| Course Name: Building Maintenance Technology II **TSDS PEIMS Code:** 13005500 | | | **Course Credit:** 2.0  **Course Requirements:** This course is recommended for students in Grades 11-12.  **Prerequisites:** Building Maintenance Technology I. |
| **Course Description:** In Building Maintenance Technology II, students will continue to gain advanced knowledge and skills needed to enter the workforce as a building maintenance technician or supervisor and construction project manager or secure a foundation for a postsecondary degree in construction management, architecture, or engineering. Students will acquire knowledge and skills in safety, Occupational Safety and Health Administration (OSHA) standards, and safety devices in electrical circuits; maintenance of electrical and heating, ventilation, and air conditioning (HVAC) systems; and concepts of historic preservation. | | | |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. | | | |
| **Total Number of Periods**  **Total Number of Minutes**  **Total Number of Hours** | 350 Periods  15,750 Minutes  262.5 Hours\* | \*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc. | |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | **TEKS Covered**  **130.45 Knowledge and Skills** | |
| **Unit 1: Employability Skills**  This unit explores the professional standards and employability skills required by business and industry. Students will grow to understand that responsibility, time management, organization, positive attitude, and good character have a large impact on employability and job retention. Students will identify interests, abilities, aptitudes, values, and personality traits as they relate to career planning, to develop a keen understanding of the value and benefit of work, and to differentiate between jobs and careers. Students will demonstrate the importance of positive work ethics and soft skills in relation to educational and career success including, but not limited to, appearance, attendance, attitude, character, communication, cooperation, organizational skills, productivity, respect, honesty, motivation, creativity, leadership, critical thinking, risk-taking, flexibility, questioning, and problem-solving, and teamwork. Students will understand the professional ethics legal responsibilities pertaining to the animal systems industry. | 20 Periods  900 Minutes | 1. The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (A) express ideas and messages to others in a clear, concise, and effective manner, including explaining and justifying actions convincingly and effectively conveying written information and messages in a socially acceptable manner that is easily understandable;  (B) compile data using numbers in various formats to solve job-appropriate problems;  (C) demonstrate an ability to be trustworthy and honest, to choose the ethical course of action, and to comply with all applicable rules, laws, and regulations;  (D) demonstrate consistency, punctuality, dependability, reliability, and responsibility in reporting for duty and performing assigned tasks as directed; and  (E) evaluate systems and operations; identify causes, problems, patterns, or issues; and explore workable solutions or remedies to improve situations | |
| **Unit 2: Industry Regulations, Compliance, and Workplace Safety**  This unit will expose students to the important compliance, safety standards, and regulations that are implemented within this industry. Students will learn that such practices are in place to manage resources to minimize losses and liabilities to businesses in the industry. Students will determine the role of risk management in the construction industry including, but not limited to, discussions focusing on liability insurance, sanitation, OSHA and EPA regulations, emergency situations, building code, MSDS, and security issues. | 25 Periods  1,125 Minutes | 2. The student demonstrates knowledge of basic worksite safety regulations and safety guidelines. The student is expected to:  (A) demonstrate safe working procedures during building maintenance and repair;  (B) explain the purpose of the OSHA and how to promote on-site safety;  (C) identify electrical hazards and how to avoid or minimize them;  (D) explain obligations of workers, supervisors, and managers to ensure a safe work environment;  (E) discuss the causes, effects, and costs of accidents; and  (F) define safe work procedures regarding personal protective equipment, hazardous chemicals, and potential construction hazards, including hazardous material exposures, welding, cutting hazards, and confined spaces | |
| **Unit 3: Drafting and Design**  Students will differentiate between the different building trades’ plans and specifications. Students will demonstrate the use of the alphabet of lines and read and interpret basic codes. Students will compare differences in symbols and abbreviations between the building trades including electrical, mechanical, and plumbing. Students will read and interpret plans, elevations, schedules, sections, and details contained on basic construction drawings. | 25 Periods  1,125 Minutes | 3. The student knows how to interpret blueprint drawings, various symbols, schematics, one-line diagrams, and wiring diagrams. The student is expected to:  (A) explain the basic layout of a blueprint drawing;  (B) identify the common symbols used on commercial construction drawings; and  (C) read equipment schedules found on blueprint drawings | |
| **Unit 4: Fuses and Circuit Breakers**  Students will learn how fuses, circuit breakers, and ground fault circuit interrupters (GFCI) provide overcurrent protection in electrical circuits. Students will use technical vocabulary when describing the functionality of single-element and time-delay fuses as well as with thermal and magnetic circuit breakers. | 35 Periods  1,575 Minutes | 4. The student knows how to handle fuses and circuit breakers. The student is expected to:  (A) explain the necessity of overcurrent protection devices in electrical circuits;  (B) define the terms associated with fuses and circuit breakers;  (C) describe the operation of a circuit breaker;  (D) describe the operation of single-element and time-delay fuses;  (E) explain how ground fault circuit interrupters can save lives; and  (F) describe troubleshooting and maintenance techniques for overcurrent devices | |
| **Unit 5: Electrical Fixtures**  Students will differentiate between different types of electrical lighting fixtures including lamps, surface mounted, recessed, suspended and track-mounted. Students will compare and contrast the different types of lamps consumers can install in their electrical fixtures such as incandescent, halogen, fluorescent, light-emitting diode (LED), and high-intensity discharge an understanding of installing a variety of fixtures. Students will demonstrate the proper, safe installation of various electrical fixtures. | 35 Periods  1,575 Minutes | 5. The student installs various types of lamps and fixtures. The student is expected to:  (A) recognize the different types of lamps and explain the advantages and disadvantages of different types such as incandescent, halogen, fluorescent, and high-intensity discharge;  (B) select and install lamps into lighting fixtures; and  (C) install various lighting fixtures such as surface mounted, recessed, suspended, and track-mounted | |
| **Unit 6: Electrical Test Equipment**  Students will demonstrate proper use of various test equipment including ammeter, voltmeter, volt-ohm-multimeter, voltmeter, frequency meter, and continuity tester. Students will gather data from test equipment with both digital and analog displays. between their data displays. Students will apply a working knowledge of the math needed to calculate amperage, voltage, wattage, and resistance. | 35 Periods  1,575 Minutes | 6. The student knows various methods to properly select, inspect, use, and maintain common electrical test equipment. The student is expected to:  (A) explain the operation of and describe various test equipment such as ammeter, voltmeter, volt-ohm-multimeter, and continuity tester;  (B) explain how to read and convert from one scale to another using test equipment;  (C) explain the importance of proper meter polarity;  (D) define frequency and explain the use of a frequency meter; and  (E) explain the differences between digital and analog meters | |
| **Unit 7: Designing Circuits**  Students will demonstrate knowledge of National Electric Code (NEC) and how to use it to determine electrical service requirements for different facilities.  Students will distinguish between series, parallel, and series parallel circuits and when to use which type during wiring projects. Students will identify and electrical components used during wiring projects such as ground fault circuit interrupter (GFCI), receptors, switches, outlet boxes. Students will describe installation procedures for space heating, HVAC systems and electrical systems around swimming pools, spas, and hot tubs. | 35 Periods  1,575 Minutes | 7. The student installs and maintains electrical devices and demonstrates wiring techniques common to residential and industrial facilities. The student is expected to:  (A) describe how to determine electrical service requirements for residential and industrial facilities;  (B) select the proper wiring methods for various residential and industrial facilities;  (C) explain the role of the National Electrical Code;  (D) compute branch circuit loads and explain their installation requirements;  (E) explain the types of equipment grounding conductors such as ground fault circuit interrupter (GFCI), light fixtures, receptors, and switches and their purposes;  (F) distinguish between the sizes of outlet boxes and their various wiring methods;  (G) describe the rules for installing electric space heating and HVAC systems equipment; and  (H) describe the installation rules for electrical systems around swimming pools, spas, and hot tubs | |
| **Unit 8: HVAC**  Students will understand the basic operation of an HVAC system is conducted by three main components – air handler, heating and cooling system, and heat exchanger. Students will learn that the capacity of an HVAC system is dependent upon its functionality, i.e. heating, cooling, humidifying, dehumidifying, cleaning, or air movement. Students will analyze and describe the impact that the Clean Air Act has on the HVAC industry. | 35 Periods  1,575 Minutes | 8. The student is introduced to the basic principles of HVAC systems. The student is expected to:  (A) explain the principles of HVAC systems;  (B) describe what the Clean Air Act means to the HVAC systems industry; and  (C) identify the types of schedules and drawings used in the HVAC systems and refrigeration industries | |
| **Unit 9: HVAC Control Systems**  Identify and describe various devices used for sensing temperature, pressure, velocity, and humidity as a part of HVAC control systems. Students will understand how conventional and electronic thermostats operate, and how pneumatic and electrical circuits are used to control mechanical systems. Students will be able to analyze circuit diagrams and identify electronic and microprocessor-based controls. | 35 Periods  1,575 Minutes | 10. The student operates, tests, and adjusts conventional and electronic thermostats as well as the common electrical, electronic, and pneumatic circuits used to control HVAC systems. The student is expected to:  (A) describe how conventional and electronic thermostats operate;  (B) describe how pneumatic and electronic circuits are used to control mechanical systems;  (C) analyze circuit diagrams for electronic and microprocessor-based controls; and  (D) troubleshoot systems using various controls | |
| **Unit 10: Basic Plumbing and Piping**  Students will be able to identify the proper type of piping, tubing, and supports for plumbing projects. Students will demonstrate the proper and safe cutting and installation of plastic, steel, iron, and copper pipes and fittings. Students will understand the importance of pressure-testing of an installed plumbing project. | 35 Periods  1,575 Minutes | 9. The student installs, selects, prepares, joins, and supports copper and plastic pipes and fittings. The student is expected to:  (A) describe the precautions that must be taken when installing refrigerant piping;  (B) select the right tubing for a project;  (C) cut and bend copper tubing;  (D) determine the kinds of hangers and supports needed for refrigeration piping;  (E) describe the requirements for pressure-testing an installed system;  (F) identify types of plastic pipe and describe their uses; and  (G) cut and join lengths of plastic pipe | |
| **Unit 11: Historic Preservation and Renovation**  Students will research the US Department of Interior’s guidelines for historic preservation of buildings and structures. Students will describe local rules, regulations and building code for preservation. | 35 Periods  1,575 Minutes | 11. The student knows the concepts of historic preservation and local and national resources to maintain and renovate historic structures and landscapes. The student is expected to:  (A) research the U.S. Department of Interior's methods and guides for historic preservation;  (B) describe the rules and regulations for historic preservation as prescribed by the Texas Historical Commission; and  (C) describe the historic preservation building codes for a local area | |