Scope & Sequence

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| **Course Name:** Small Engine Technology II  **TSDS PEIMS Code:** 13040100 | | | | | | | **Course Credit:** 2.0  **Course Requirements:** Recommended for students in Grades 10-12.  **Prerequisites:** Small Engine Technology l. | |
| **Course Description:** Small Engine Technology II includes advanced knowledge of the function, diagnosis, and service of the systems and components of all types of small engines such as outdoor power equipment, motorcycles, generators, and irrigation engines. This course is designed to provide hands-on and practical application for employment in the small engine technology industry. Instruction includes the repair and service of cooling, air, fuel, lubricating, electrical, ignition, and mechanical systems and small engine overhauls. In addition, students will receive instruction in safety, academic, and leadership skills as well as career opportunities. | | | | | | | | |
| **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. Scope and sequence allows additional time for lab work, guest speakers, student presentations, field trips, remediation, and extended learning activities, etc. | | |
| **Unit Number, Title, and Brief Description** | | | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | | | **TEKS Covered**  **130.446. (c)** **Knowledge and skills** | | |
| **Unit 1: Career Exploration**  Students will continue to expand their knowledge base and interest in careers and entrepreneurship opportunities in the small engine technology industry. Students will discuss certification opportunities and employers’ expectations as they develop personal goals and strategic plans for a successful career in the small engine technology industry, as well as begin to document their progress and achievements. Students will demonstrate appropriate and proper etiquette and behavior in this and in all units, and while discovering and using resources available through Career and Technical Student Organizations (CTSO) or other extracurricular organization(s) to further develop employability skills. | | | 10 periods  450 minutes | | | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (A) identify career development and entrepreneurship opportunities in the small engine technology industry;  (B) identify careers in the small engine technology industry;  (C) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in the small engine technology industry;  (D) discuss certification opportunities;  (G) identify employers' expectations, appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills; and  (H) develop personal goals, objectives, and strategies as part of a plan for future career and educational opportunities.  (2) The student demonstrates appropriate personal and communication skills. The student is expected to:  (B) demonstrate proper etiquette and behavior.  (3) The student participates in opportunities for leadership development and personal growth. The student is expected to:  (A) participate in the planning and development of leadership and skill development activities such as conducting effective meetings, team building activities, and strategic planning;  (B) use resources available through an organizations such as a career and technical student organizations to develop employability skills; and  (C) record individual progress to document achievements. | | |
| **Unit 2: Small Engine Technology--Yesterday, Today, and Tomorrow**  Students will identify and discuss historical and current events and issues affecting the small engine technology industry. Students will discuss and describe how laws, regulations, safety, environmental issues, emerging technologies, and local and global marketing conditions currently affect the small engine technology industry, and how these and other factors may impact it in the future. | | | 10 periods  450 minutes | | | (4) The student describes the historical, current, and future significance of the small engine technology industry. The student is expected to:  (A) describe emerging technologies and their impact on the small engine technology industry;  (B) compare and contrast issues affecting the small engine technology industry related to employment, safety, environmental, and regulatory issues; and  (C) describe local and global market conditions and practices that impact the application and need of the small engine technology industry. | | |
| **Unit 3: Health and Safety**  Students will discuss and identify employers’ expectations regarding safe and appropriate work habits, ethical conduct, and legal responsibilities in the workplace. Students will demonstrate knowledge, leadership, and effective speaking skills in classroom activities and/or in small groups as they model, present, and discuss health and safety workplace scenarios as well as response plans to potential emergency situations. | | 20 periods  900 minutes | | | 1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (C) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in the small engine technology industry;  (E) demonstrate skills and knowledge of personal and occupational health and safety in the workplace;  (F) discuss response plans to emergency situations;  (G) identify employers' expectations, appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills;  (2) The student demonstrates appropriate personal and communication skills. The student is expected to:  (F) demonstrate effective speaking skills through prepared and extemporaneous oral presentations.  (3) The student participates in opportunities for leadership development and personal growth. The student is expected to:  (A) participate in the planning and development of leadership and skill development activities such as conducting effective meetings, team building activities, and strategic planning; | | | |
| **Unit 4: Maintenance and Operation**  Students will participate in hands-on presentations, discussions, and demonstrations on the proper ways to maintain and operate a small engine maintenance facility. Students will develop and evaluate preventative maintenance plans and systems, complete repair orders and related paperwork, estimate costs, and describe common business management principles related to the industry. Students will also locate, read, and interpret service repair information and manuals from a variety of sources. | | 40 periods  1,800 minutes | | | (5) The student identifies the skills used to maintain and operate a small engine maintenance facility. The student is expected to:  (A) develop, evaluate, and perform preventative maintenance plans and systems to keep facility, tools, and equipment operating safely and properly;  (B) complete repair orders and paperwork related to the small engine technology industry to properly document work needed or completed such as ensuring proper customer communication and authorization;  (C) estimate parts and labor costs on repair orders for small engine repair;  (D) describe common business management principles such as technician productivity, shop efficiency, and profit margins; and  (E) locate, read, and interpret service repair information such as small engine schematics, charts, and technical bulletins.  (7) The student applies problem-solving, mathematical, and organizational skills to maintain financial and logistical records. The student is expected to:  (B) develop and maintain records appropriate to the small engine technology industry. | | | |
| **Unit 5: Mathematical Skills and Formulas for Small Engine Technology**  Students will be given multiple opportunities to describe, demonstrate, and apply relevant problem-solving and mathematical skills in-context as they collect, organize, and analyze data associated with small engine technology. Students will be given multiple opportunities for hands-on presentations and practical demonstrations on how to use appropriate mathematical formulas and electrical principles to perform a variety of small engine and component calculations and repairs. | | | 40 periods  1,800 minutes | | | (7) The student applies problem-solving, mathematical, and organizational skills to maintain financial and logistical records. The student is expected to:  (C) collect and organize data in graphs, tables, and charts;  (D) analyze and interpret data from graphs, tables, and charts;  (E) use mathematical formulas to perform engine calculations such as calculating cylinder volume, engine performance and enhancement, engine displacement, combustion chamber volume, compressed head gasket volume, piston and deck height, piston dish volume, dome volume, cylinder volume, compression ratio, and horsepower;  (F) use mathematical formulas to perform electrical calculations such as calculating and measuring electrical resistance, current, and voltage in engines;  (G) apply Ohm's law to small engine electrical circuits using a digital multimeter; and  (H) apply electrical principles to diagnose and repair small engine components such as generators, electric motors, power supplies, electronic amplifiers, relays, and circuits. | | | |
| **Unit 6: Technical Knowledge and Skills**  Students will have an opportunities for hands-on presentations and practical demonstrations of the correct use of small engine measuring tools and test equipment to demonstrate their technical knowledge of small engine designs, components, and applications. | | 40 periods  1,800 minutes | | | (9) The student demonstrates **advanced** technical knowledge and skills of small engine technology. The student is expected to:  (A) demonstrate the use and application of small engines and components;  (B) demonstrate the components of electrical-electronic systems;  (C) demonstrate knowledge of engine designs, components, and applications; and  (D) demonstrate the correct use of engine measuring tools and test equipment. | | | |
| **Unit 7: Troubleshooting**  Students will be given multiple opportunities to use a variety of resources to research, troubleshoot, diagnose, and repair small engine concerns and failures. Students will describe and use the scientific method of research as it relates to troubleshooting and repairing small engines, and have multiple opportunities for hands-on presentations and practical demonstrations. | | 40 periods  1,800 minutes | | | (6) The student applies appropriate research methods to small engine technology topics. The student is expected to:  (A) use a variety of resources to research, trouble shoot, and diagnose concerns and failures; and  (B) describe the application of the scientific method of research to small engine technology such as identifying a problem, establishing a procedure, performing direct and indirect observation, collecting and interpreting data, and drawing conclusions by verifying the complaint, determining the related symptoms, analyzing the symptoms, isolating the trouble, correcting the trouble, and checking for proper operation.  (10) The student demonstrates advanced technical knowledge and skills in simulated or actual work situations. The student is expected to:  (A) troubleshoot and repair small engines. | | | |

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| **Unit 8: Measurements and Maintenance**  Students will demonstrate his/her technical knowledge of small engine technology, preventative maintenance, installation, and testing tools and equipment with hands-on presentations and task performances in simulated and/or actual work situations. | 40 periods  1,800 minutes | (10) The student demonstrates advanced technical knowledge and skills in simulated or actual work situations. The student is expected to:  (B) perform preventative maintenance on small engines;  (C) assess the proper fuel mixtures and analyze the efficiency of various fuels used in small engines;  (D) distinguish between valve arrangement positions and analyze valve timing with respect to crankshaft rotation;  (E) perform preventative maintenance and service engine lubrication, cooling, starting, fuel, and ignition systems and associated fluids and filters;  (F) perform routine installations, inspections, adjustments, and maintenance on small engine testing tools and equipment;  (G) demonstrate knowledge of electrical testing tools and equipment commonly used in small engine maintenance such as digital multimeters;  (H) perform measurements using precision instruments such as micrometers, dial indicators, and Vernier calipers; and  (I) inspect and measure small engine parts for wear tolerances and compare to specifications. |
| **Unit 9: Technology Tools**  Students will successfully use technology tools to prepare a resume and develop his/her course culminating career project. Students will explore technology tools such as GIS and GPS. Students will discuss and use other computer-based tools and software to develop and maintain records appropriate to the small engine technology industry. | 30 periods  1,350 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (I) prepare a resume.  (7) The student applies problem-solving, mathematical, and organizational skills to maintain financial and logistical records. The student is expected to:  (A) develop project proposals;  (B) develop and maintain records appropriate to the small engine technology industry;  (8) The student uses information technology tools specific to the small engine technology industry to access, manage, integrate, and create information. The student is expected to:  (A) use personal management software such as email and Internet applications and word-processing, database, spreadsheet, presentation, collaborative, groupware, and virtual meeting software;  (B) discuss Geographic Information Systems and Global Positioning Systems applications; and  (C) use other computer-based equipment. |
| **Unit 10: Workplace Conduct and Communication**  Students will describe and demonstrate workplace ethics, legal responsibilities, and appropriate personal appearance, habits, and communication skills in various workplace scenarios. Proper workplace conduct, appearance, and etiquette will be discussed and demonstrated in small groups and/or whole group activities to reinforce the practice of effective speaking and listening skills. | 10 periods  450 minutes | (2) The student demonstrates appropriate personal and communication skills. The student is expected to:  (A) describe, demonstrate, and apply ethical and legal responsibilities for appropriate workplace conduct;  (B) demonstrate proper etiquette and behavior;  (C) demonstrate appropriate personal appearance and hygiene;  (D) demonstrate effective written and oral communication skills and employ effective listening skills;  (E) demonstrate advanced technical writing and preparation skills; and  (F) demonstrate effective speaking skills through prepared and extemporaneous oral presentations. |
| **Unit 11: Show and Tell**  Students will report and demonstrate their course learning and technical knowledge in whole class and/or small group presentations in simulated and/or actual task and work situations. Students will demonstrate effective listening and speaking skills during presentations. | 50 periods  2,250 minutes | (10) The student demonstrates advanced technical knowledge and skills in simulated or actual work situations. The student is expected to:  (J) demonstrate the relationship between an electric current and magnetic field in ignition, starting, and charging systems with the use of test equipment;  (K) analyze the effects of heating and cooling on small engines;  (L) explain the thermophysical properties of fluids commonly used in small engine systems;  (M) explain the laws of thermodynamics;  (N) explain torque, horsepower, and heat energy transfer in small engines;  (O) calculate speed and acceleration in small engines; and  (P) compare and contrast efficiency of various engine sizes and types.  (2) The student demonstrates appropriate personal and communication skills. The student is expected to:  (D) demonstrate effective written and oral communication skills and employ effective listening skills; and  (F) demonstrate effective speaking skills through prepared and extemporaneous oral presentations. |
| **Unit 12: Small Engine Technology II Career Project**  Students will participate in a project-based culminating activity, which will include a written plan to earn certification and/or begin a successful career in small engine technology or other transportation-related field. As part of the project, students will participate in mock interviews both as applicants and as potential employers, and review and revise resumes. | 20 periods  900 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (A) identify career development and entrepreneurship opportunities in the small engine technology industry;  (C) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in the small engine technology industry;  (H) develop personal goals, objectives, and strategies as part of a plan for future career and educational opportunities;  (I) prepare a resume; and  (J) demonstrate job interview skills.  (2) The student demonstrates appropriate personal and communication skills. The student is expected to:  (A) describe, demonstrate, and apply ethical and legal responsibilities for appropriate workplace conduct;  (B) demonstrate proper etiquette and behavior;  (C) demonstrate appropriate personal appearance and hygiene;  (D) demonstrate effective written and oral communication skills and employ effective listening skills;  (E) demonstrate advanced technical writing and preparation skills; and  (F) demonstrate effective speaking skills through prepared and extemporaneous oral presentations.  (7) The student applies problem-solving, mathematical, and organizational skills to maintain financial and logistical records. The student is expected to:  (A) develop project proposals. |