# Scope & Sequence

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| Course Name: Aircraft Power Plant Technology **TSDS PEIMS Code:** 13039500 | **Course Credit:** 2.0**Course Requirements:** Grade Placement: 11 – 12. **Prerequisites:** Introduction to Aircraft Technology. |
| **Course Description:** Aircraft Power Plant Technology is designed to teach the theory of operation of aircraft power plants and associated maintenance and repair practices. Power plant maintenance and repair practices include knowledge of the theory, function, diagnosis, and service of power plant, systems, and components of aircraft. Industry-recognized professional licensures, certifications, and registrations are available for students who meet the requirements set forth by the accrediting organization. |
| **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 Periods15,750 Minutes262.50 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****130.454. (c) Knowledge and skills** |
| **Unit 1: Professional Standards and Career Exploration**Students will expand their knowledge base and interest in careers and entrepreneurship opportunities in the field of aircraft maintenance and repair. Students will explore and discuss employment opportunities, employers' expectations, and industry certifications and requirements in small groups and as a class as they continue develop their individualized career preparation plans. Students will discuss and demonstrate personal responsibility, ethical decision-making, and appropriate and proper etiquette and behavior as well as effective listening and speaking skills in this and in all units as they further develop their personal and career goals and increase their interpersonal skills. | 15 periods675 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:(A) discuss employment opportunities, including entrepreneurship opportunities, and certification requirements for the field of aircraft maintenance and repair;(B) demonstrate the principles of group participation and leadership related to citizenship and career preparation;(C) evaluate employers' expectations and appropriate work habits;(F) demonstrate awareness of the technical knowledge, skills, and attitudes related to human factors in a successful and profitable workplace, and the role of the employee in creating that success, including personal responsibility; and(G) apply reasoning to a variety of workplace situations in order to make ethical decisions.(6) The student demonstrates appropriate interpersonal and communication skills. The student is expected to:(A) describe and apply ethical and legal responsibilities appropriate to the workplace;(B) demonstrate the uses of proper etiquette and behavior;(C) identify benefits of personal appearance and health habits;(D) practice written and oral communication skills; and(E) employ effective listening skills. |
| **Unit 2: Leadership and Occupational Experiences**Students will research and discuss resources and activities available through CTSO or other extracurricular organization(s) to further develop leadership and employability skills. Students will create an actual or simulated industry-based occupational experience, which will include a work plan, a budget, and a demonstration of proper record-keeping skills. As part of this project students will include a plan for and/or information about available industry recognized certifications and their requirements. Students will display effective communication skills when they discuss their occupational experience projects in small groups or in other classroom activities. Students will also produce a program of activities and/or participate in other leadership opportunities in a CTSO or other extracurricular organization(s) to further develop and demonstrate their leadership and employability skills.  | 20 periods900 minutes | (6) The student demonstrates appropriate interpersonal and communication skills. The student is expected to:(B) demonstrate the uses of proper etiquette and behavior;(D) practice written and oral communication skills; and(E) employ effective listening skills.(7) The student learns the value of and how to develop an occupational experience program as it relates to the aircraft industry. The student is expected to:(A) apply proper record-keeping skills as related to industry-based occupational experiences;(B) participate in youth leadership opportunities to create a well-rounded occupational experience;(C) produce a program of activities for a career and technical student organization or other leadership opportunity; and(D) develop a work plan and budget. |
| **Unit 3: Health and Safety**Students will discuss, describe, and demonstrate employers’ expectations regarding safe and appropriate work habits, competencies, ethical conduct, and legal responsibilities in the workplace. Students will participate as a class and/or in small groups in activities to model, discuss, and demonstrate technical knowledge and health and safety scenarios, regulations, and safety equipment in the workplace, as well as an understanding of how human factors affect health, safety, and profitability. Multiple opportunities for students to learn and demonstrate their knowledge of the function, application, and safe use of tools and equipment and the proper handling and disposal of environmentally hazardous materials used in servicing aircraft will begin in this unit. | 55 periods2,475 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:(B) demonstrate the principles of group participation and leadership related to citizenship and career preparation;(C) evaluate employers' expectations and appropriate work habits;(D) discuss the competencies related to resources, information systems, and technology;(E) demonstrate knowledge of the technology and skills related to human factors in health and safety in the workplace, as specified by appropriate governmental regulations and an understanding of personal responsibility in this area;(F) demonstrate awareness of the technical knowledge, skills, and attitudes related to human factors in a successful and profitable workplace, and the role of the employee in creating that success, including personal responsibility; and(G) apply reasoning to a variety of workplace situations in order to make ethical decisions.(4) The student knows the function and application of the tools, equipment, technologies, and preventative maintenance used in airframe maintenance and repair. The student is expected to:(A) demonstrate knowledge and a high degree of skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft; and(B) demonstrate knowledge of the proper handling and disposal of environmentally hazardous materials used in maintaining and servicing aircraft. |
| **Unit 4: Academic and Communication Skills in Aircraft Maintenance and Repair**Students will be given multiple opportunities to demonstrate and apply relevant problem-solving and academic skills in-context as they read and interpret documents, manuals, regulations, charts, graphs, logbooks, and other information related to aircraft maintenance and repair. Students will demonstrate effective oral and written communication skills with individuals from various cultures such as fellow workers, management, and customers in simulated workplace scenarios and occupational tasks related to completing logbooks, following work orders and related paperwork, completing estimates, and other occupational tasks related to aircraft maintenance and repair. Students will demonstrate knowledge of appropriate terminology and standard practices as well as the tools required to complete maintenance, modifications, and repairs and further develop their critical thinking and structured problem-solving skills as they perform various precision measurements and diagnose power plant system malfunctions, solve problems, and make decisions. After researching the impact of new and emerging aircraft technologies and discussing Boyle's Law and Charles' Law as well as competencies related to resources, information systems, and technology, students will discuss and predict what other academic skills may be necessary for successful careers in aircraft maintenance and repair.  | 50 periods2,250 minutes | (2) The student relates academic skills to the requirements of aircraft maintenance and repair. The student is expected to:(A) demonstrate effective oral and written communication skills with individuals from various cultures, including fellow workers, management, and customers;(B) follow work orders and related paperwork;(C) develop an understanding of how to estimate parts and labor costs on power plant repair orders;(D) locate, read, understand the function of, and interpret documents, including schematics, charts, graphs, drawings, blueprints, wiring diagrams, service-repair manuals and service bulletins, type certificate data sheets, supplemental type certificates, airworthiness directives, and federal aviation regulations and advisory information;(E) demonstrate an understanding of metric and U.S. customary standard measurement systems;(F) perform precision measurements, including the use of engineering scales, dial calipers, and Vernier micrometers; and(G) employ critical-thinking skills and structured problem-solving skills to diagnose power plant system malfunctions, solve problems, and make decisions.(3) The student knows the technical knowledge and skills of aircraft maintenance and repair. The student is expected to:(B) apply and understand the principles of simple machines, fluid dynamics, and heat dynamics, including Boyle's Law and Charles' Law;(H) demonstrate knowledge of aircraft common terminology and standard practices and the tools required to complete maintenance, modifications, and repairs; and(I) discuss the completion of logbooks and computer applications to maintain required aircraft documents.(4) The student knows the function and application of the tools, equipment, technologies, and preventative maintenance used in airframe maintenance and repair. The student is expected to:(C) research and understand the impact of new and emerging aircraft technologies. |
| **Unit 5: Technical Knowledge and Skills**Students will continue to be given multiple opportunities for “hands-on” presentations, discussions, and demonstrations of the proper ways to identify and safely use the tools, materials, and equipment commonly used in aircraft maintenance and repair. Students will demonstrate understanding of aircraft reciprocating engines, aircraft turbine engines, and power plant systems and components, in classroom, actual, and/or simulated aircraft maintenance and repair activities. Students will learn and review the necessary steps to perform a reciprocating engine overhaul following industry best practices, and identify and select appropriate nondestructive testing methods for component inspections. Students will also continue to learn and demonstrate their knowledge of relevant aviation terminology and regulations in-context with their unit activities. | 70 periods3,150 minutes | (3) The student knows the technical knowledge and skills of aircraft maintenance and repair. The student is expected to:(A) demonstrate knowledge of aviation regulations prescribed by the Code of Federal Regulations, Title 14, Volumes I-III, that govern mechanic privileges, the construction, maintenance, and service of aircraft, and 100-hour and annual inspections;(C) demonstrate understanding of aircraft reciprocating engines, including the operating theory, cylinder configurations, functions, and service and repair methods and techniques for two-cycle, four-cycle, and diesel engines;(D) demonstrate understanding of aircraft turbine engines, including the operating theory, mechanical arrangements, functions, and service and repair methods and techniques for turbojet, turbofan, turboprop, and turboshaft engines;(E) demonstrate knowledge of power plant systems and components, their functions, and basic operating principles, including engine instruments, fire protection systems, electrical systems, lubrication systems, ignition and starting systems, fuel metering systems, fuel delivery systems, inductions systems, cooling systems, exhaust systems, and propellers;(F) review the necessary steps to perform a reciprocating engine overhaul following industry best practices;(G) identify and select appropriate nondestructive testing methods for component inspections, including dye penetrant, eddy current, ultrasonic, and magnetic particle inspections; and(H) demonstrate knowledge of aircraft common terminology and standard practices and the tools required to complete maintenance, modifications, and repairs.(4) The student knows the function and application of the tools, equipment, technologies, and preventative maintenance used in airframe maintenance and repair. The student is expected to:(A) demonstrate knowledge and a high degree of skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft. |
| **Unit 6: Preventative Maintenance, Tools, and Equipment**Students will be given multiple opportunities to demonstrate their technical knowledge and skills in the field of aircraft maintenance and repair with “hands-on” activities, presentations, discussions, and inspections in simulated or actual aircraft maintenance and repair work situations. Students will continue to learn and use the appropriate terminology as well as standard practices and procedures as they participate in audits, inspections, maintenance, and repair activities. Students will identify and understand the need for preventative maintenance procedures and practices, and demonstrate knowledge and a high degree of skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft. Students will also learn and demonstrate how to accurately determine power plant component wear accurately by using precision measuring and published specifications to determine if a given component is within wear tolerance and research necessary repairs. As culminating activities for the unit, students will research proper repair methods for a simulated repair and write a work order, create an appropriate inspection checklist, and describe the detailed function and operation of a reciprocating and a turbine aircraft power plant using drawings and written descriptions. | 70 periods3,150 minutes | (4) The student knows the function and application of the tools, equipment, technologies, and preventative maintenance used in airframe maintenance and repair. The student is expected to:(A) demonstrate knowledge and a high degree of skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft; and(D) identify and understand the need for preventative maintenance procedures and practices.(5) The student applies the technical knowledge and skills of the trade to simulated and actual work situations. The student is expected to:(A) determine power plant component wear accurately by using precision measuring and published specifications to determine if a given component is within wear tolerance and research necessary repairs;(B) research proper repair methods for a simulated repair and write a work order that calls out specific maintenance references and estimates cost of repairs;(C) create an appropriate inspection checklist for a given power plant based on regulated mandatory inspection points for an annual inspection and perform the inspection;(D) describe the detailed function and operation of a reciprocating and a turbine aircraft power plant using drawings and written descriptions;(E) describe the detailed function and operation of a reciprocating or turbine aircraft power plant system or component using drawings and written descriptions;(H) indicate and select proper products used in preventative maintenance for a given power plant from appropriate maintenance publications; and(I) perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations. |
| **Unit 7: Course Culmination Demonstration and Performance Activities** Students will participate in course culmination activities which will include a demonstration of technical knowledge and skills, knowledge of aviation regulations that govern mechanic privileges, the construction, maintenance, and service of aircraft, and 100-hour and annual inspections, and knowledge and use of common terminology, standard practices, and the tools required to complete assigned maintenance, modifications, and repairs. Students will also construct a detailed engine troubleshooting chart showing possible defects and resulting effects on engine performance of a reciprocating or turbine aircraft power plant as well as perform a real or simulated audit and/or inspection designed to maintain compliance with safety, health, and/or environmental regulations. Students will also participate in mock interviews both as job applicants and as potential employers, as well as create and/or participate in various workplace scenarios that demonstrate appropriate workplace conduct, employer expectations, and personal application of ethical and legal responsibilities. As part of these mock interviews and workplace scenarios, students will demonstrate appropriate personal appearance, etiquette, group participation, teamwork, and effective listening and communication skills. | 70 periods3,150 minutes | (3) The student knows the technical knowledge and skills of aircraft maintenance and repair. The student is expected to:(A) demonstrate knowledge of aviation regulations prescribed by the Code of Federal Regulations, Title 14, Volumes I-III, that govern mechanic privileges, the construction, maintenance, and service of aircraft, and 100-hour and annual inspections; and(H) demonstrate knowledge of aircraft common terminology and standard practices and the tools required to complete maintenance, modifications, and repairs.(5) The student applies the technical knowledge and skills of the trade to simulated and actual work situations. The student is expected to:(F) construct a detailed engine troubleshooting chart showing possible defects and resulting effects on engine performance of a reciprocating or turbine aircraft power plant;(G) apply aircraft maintenance and repair essential knowledge and skills to learning experiences such as job shadowing, mentoring, apprenticeship training, and career preparation; and(I) perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations.(6) The student demonstrates appropriate interpersonal and communication skills. The student is expected to:(A) describe and apply ethical and legal responsibilities appropriate to the workplace;(B) demonstrate the uses of proper etiquette and behavior;(C) identify benefits of personal appearance and health habits;(D) practice written and oral communication skills; and(E) employ effective listening skills. |