# Scope & Sequence

|  |  |
| --- | --- |
| **Course Name:** Solid State Electronics**TSDS PEIMS Code:** 13036900 | **Course Credit:** 1.0**Course Requirements:** Recommended for students in Grades 11-12. **Prerequisites:** AC/DC Electronics. |
| **Course Description:** In Solid State Electronics, students will demonstrate knowledge and applications of advanced circuits, electrical measurement, and electrical implementation used in the electronics and computer industries. Students will transfer advanced academic skills to apply engineering principles and technical skills to troubleshoot, repair, and modify electronic components, equipment, and power electronic systems in a project-based environment. Additionally, students will explore career opportunities, employer expectations, and educational needs in the electronics industry. |
| **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** | 175 Periods7875 Minutes131.25 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****130.406. (c) Knowledge and skills** |
| **Unit 1: Science, Technology, Engineering, and Mathematics (STEM) Solid State Electronics Overview**This Science, Technology, Engineering, and Mathematics (STEM) Solid State Electronic Overview unit is designed to give students the opportunity to explore training, education, employment roles and career opportunities. Students will investigate and create a plan to achieve industry certifications. Upon culmination of the unit, students will discuss ethical issues related to electronics and incorporating proper ethics in submitted projects, as well as identify appropriate actions and consequences relating to discrimination, harassment, and inequality. | 15 Periods675 Minutes11.25 Hours | (2) The student demonstrates the skills necessary for success in a technical career. The student is expected to:(A) identify training, education, employment, and career opportunities, including differences between an electronic technician, electronic technologist, and electrical engineer;(B) identify employment and career opportunities;(C) identify industry certifications;(D) discuss ethical issues related to electronics and incorporate proper ethics in submitted projects;(E) identify and demonstrate respect for diversity in the workplace;(F) identify appropriate actions and consequences relating to discrimination, harassment, and inequality. |
| **Unit 2: Science, Technology, Engineering, and Mathematics (STEM) Solid State Electronics Career Exploration**In this unit, students will explore electronics career and preparation programs. Upon culmination of the unit, students will submit findings about career preparation, including job shadowing, mentoring, and apprenticeship training.  | 15 Periods675 Minutes11.25 Hours | (2) The student demonstrates the skills necessary for success in a technical career. The student is expected to:(G) explore electronics career and preparation programs;(H) explore career preparation learning experiences, including, but not limited to, job shadowing, mentoring, and apprenticeship training; and(I) discuss Accreditation Board for Engineering and Technology(ABET) accreditation and implications. |
| **Unit 3: Safety Precautions**This unit offers students the opportunity to demonstrate basic technical skills necessary for safety precautions in the STEM field. Students will adhere to and follow all guidelines and regulations to maintain a safe working environment. The culminating activity will have students describe the results of negligent or improper maintenance of tools, equipment, and machines. | 10 Periods450 Minutes7.5 Hours | (6) The student practices safe and proper work habits. The student is expected to:(A) master relevant safety tests;(B) comply with safety guidelines as described in various manuals, instructions, and regulations;(C) identify governmental and organizational regulations for health and safety in the workplace related to electronics;(D) identify and classify hazardous materials and wastes according to Occupational Safety and Health Administration (OSHA) regulations and industry standards;(E) dispose of hazardous materials and wastes appropriately;(F) perform maintenance on selected tools, equipment, and machines;(G) handle and store tools and materials correctly; and(H) describe the results of negligent or improper maintenance of material, tools, and equipment. |
| **Unit 4: Teamwork in STEM**In this unit students will demonstrate teamwork processes that promote team building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution. Students will collaborate to work together efficiently, using positive interpersonal skills to establish and maintain effective working relationships. The culminating activity will be for the students to identify and demonstrate the proper attitude found in team leaders in the field of electronics. | 15 Periods675 Minutes11.25 Hours | (3) The student participates in team projects in various roles. The student is expected to:(A) explain the importance of teamwork in the field of electronics;(B) apply principles of effective teamwork and problem solving, including collaboration and conflict resolution; and(C) demonstrate proper attitudes as a team leader and team member. |
| **Unit 5: Project Management**In this unit, students will develop a project management plan including initiating, executing, monitoring, controlling, and closing a real or simulated project. The culminating activity will have students develop and present a production plan for an individual project. | 15 Periods675 Minutes11.25 Hours | (4) The student develops skills for managing a project. The student is expected to:(A) implement project management methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project;(B) develop a project schedule and complete work according to established criteria;(C) participate in the organization and operation of a real or simulated engineering project; and(D) develop a plan for production of an individual product. |
| **Unit 6: Employability Skills**This unit offers students basic technical skills necessary to fulfill careers in the workforce. Through group activities, students will demonstrate interpersonal skills, such as: communication, professionalism, decision-making, leadership, and conflict resolution. The unit culminates with a peer review evaluation and reflection upon skills needed for success in the workforce. | 15 Periods675 Minutes11.25 Hours | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:(A) demonstrate knowledge of how to dress appropriately, speak politely, and conduct oneself in a manner appropriate for the profession;(B) show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome;(C) present written and oral communication in a clear, concise, and effective manner, including explaining and justifying actions;(D) demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results; and(E) demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed. |
| **Unit 7: Time for Project Based Learning**In this unit, students will apply Ohm's and Kirchhoff’s laws to advanced circuit theories. The project-based rubrics will be used to measure students’ applications of competencies such as of the theory of various currents through Thevenin and Norton’s theorems. The culminating activity for this unit will be for students to apply knowledge of voltage regulation devices and demonstrate knowledge of solid-state components and devices such as a power supply design. | 15 Periods675 Minutes11.25 Hours | (7) The student implements the concepts and skills that form advanced knowledge of electronics using project-based rubrics. The student is expected to:(A) apply Ohm's law, Kirchhoff's laws, and power laws to advanced circuit theory;(B) demonstrate advanced knowledge of the theory of direct current, alternating current, digital circuits, and semi-conductor circuits through Thevenin and Norton's theorems;(C) apply knowledge of voltage regulation devices;(D) apply knowledge of the design and use of diodes, transistors, and analog components with integrated circuits;(E) implement knowledge of solid-state components and devices such as a power supply design. |
| **Unit 8: Project Based Learning II**In this unit, students will demonstrate knowledge of the similarities and differences in optoelectronic devices and knowledge of microprocessor applications. The project-based rubrics will be used to measure students’ applications of competencies such as of completing advanced electrical-electronic troubleshooting assignments to industry standards. | 15 Periods675 Minutes11.25 Hours | (7) The student implements the concepts and skills that form advanced knowledge of electronics using project-based rubrics. The student is expected to:(F) demonstrate knowledge of the similarities and differences in optoelectronic devices;(G) implement knowledge of transmission theory;(H) implement knowledge of microprocessor applications;(I) apply electronic theory to generators, electric motors, power supplies, electronic amplifiers, electronic oscillators, communication circuits, and systems; and(J) complete advanced electrical-electronic troubleshooting assignments to industry standards. |
| **Unit 9: Tool Application, Equipment and Material Functions in Electronics**Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. In this unit, students will use precision measuring instruments to analyze circuits and prototypes and multiple software applications to simulate circuit behavior. The culminating activity will have students identify and describe the functions of computer hardware devices. | 15 Periods675 Minutes11.25 Hours | (8) The student learns the function and application of the tools, equipment, and materials used in electronics through specific project-based assessments. The student is expected to:(A) use tools and laboratory equipment in a safe manner to construct and repair circuits;(B) use precision measuring instruments to analyze circuits and prototypes;(C) describe and perform measurement techniques with analog, digital, or storage oscilloscopes;(D) use multiple software applications to simulate circuit behavior and present concepts; and(E) identify and describe the functions of computer hardware devices. |
| **Unit 10: Real-World Applications**In this unit, students will demonstrate principles of project documentation and workflow to simulated and actual work situations. The culminating activity will include having students read and interpret technical drawings, manuals, and bulletins. | 15 Periods675 Minutes11.25 Hours | (5) The student demonstrates principles of project documentation and workflow. The student is expected to:(A) complete work orders and related documentation;(B) identify factors affecting cost and strategies to minimize costs;(C) prepare a project budget;(D) prepare a production schedule;(E) identify intellectual property and other legal restrictions; and(F) read and interpret technical drawings, manuals, and bulletins. |
| **Unit 11: Designing Products**In this unit, students will perform such functions such as interpreting advanced industry standard schematics and improving a product design to meet a specified need. The culminating activity will have students use a variety of technologies to design components such as computer simulation software and explore new technologies that may affect electronics. | 15 Periods675 Minutes11.25 Hours | (9) The student designs products using appropriate design processes and techniques. The student is expected to:(A) interpret advanced industry standard schematics;(B) identify areas where quality, reliability, and safety can be designed into a product;(C) improve a product design to meet a specified need;(D) produce advanced schematics to industry standards;(E) discuss the process of obtaining a patent;(F) use a variety of technologies to design components such as computer simulation software; and(G) explore innovative technologies that may affect electronics. |
| **Unit 12: Extended Learning Experience**This unit will have students build a prototype circuit. In this unit, students are encouraged to expand their learning experiences through avenues such as STEM organizations and other leadership or extracurricular organizations. By connecting with these networks and/or their peers in the previous unit, students will present their final project, which may lead to future career opportunities.  | 15 Periods675 Minutes11.25 Hours | (10) The student builds a simulated or physical prototype using the appropriate tools, materials, and techniques. The student is expected to:(A) identify and describe the steps needed to produce a prototype;(B) identify and use appropriate tools, equipment, machines, and materials to produce the prototype; and(C) present the prototype using a variety of media to  a panel. |