

TEAU 2640 - Electrical II (4 Credits)

Course Description

Automotive Electrical Systems II is an in-depth industry-based course including these units of study: safety concerns when working on electrical systems, advanced wiring and schematics, testing and diagnosis of digital automotive systems, testing and diagnosis of automobile safety systems. This course meets the required tasks in preparation for successful certification in ASE (Automotive Service Excellence) Automotive Electrical Systems.

Course Objectives

- Diagnose and repair electronic systems through electric theory and practice.
 - Diagnose on-board computers and networked systems.
 - Diagnose, repair and program vehicle communication systems.
 - Diagnose, repair, and determine preparation of airbag and restraint systems.
 - Safely operate and diagnose hybrid drive systems.
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Course Outline

- Intro to Electronic Systems and Practical Theories
 - Computer Systems and Diagnosis I
 - Computer Systems and Diagnosis II
 - Vehicle Communication and Networks
 - Supplemental Air Bag Systems and Diagnosis
 - Driver and Passenger Comfort Systems
 - Electronic Stability, Rollover Mitigation, and Driver Systems
 - Hybrid and Electronic Vehicle Systems
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Textbook & Reading Materials

Cengage Unlimited (1 year subscription), Cengage

Assignments and Assessments

Orientation	Elec II Classroom Chapter 2 Multiple-Choice and True-False Questions
Orientation Acknowledgement	Elec II Shop CH 2 Reading: Special Tools and Procedures
Electrical Systems II Syllabus 2021-22	Elec II Shop Chapter 2 Image Labeling Activity: Graphing Meter/ Scope Screen Identification
Remind Txt Group	Elec II Shop Chapter 2 Video and Questions: Scan Tools Using the Scan Tool Simulation
STECH Auto Student Information Sheet	Reading Wiring Diagrams Simulation
Automotive Student OE Instructions	Soldering Copper Wire Simulation
STECH COVID-19 Policies and Procedures Agreement Review	Elec II Shop Chapter 2 ASE-Style Review Questions
STECH Auto Right-To-Know Agreement	Lab 1 Research applicable vehicle and service information
SWAM 1530 Electrical Systems II Lab Assignment Checklist Review	Lab 2 Use wiring diagrams to trace electrical/electronic circuits
Cleaning Expectations	Lab 3 Demonstrate the proper use of a digital multimeter when measuring source voltage and voltage drops, including grounds
Southwest Technical College Automotive Video Playlist	Lab 4 Demonstrate the proper use of a digital multimeter when measuring current flow
Student Tool and Equipment Use Waiver	Lab 5 Check electrical circuits with a test light
Cell Phone	Lab 6 Measure source voltage and perform voltage drop tests
Digital Lab Assignment Switch	Lab 7 Check continuity and measure resistance in electrical circuits
Instructions	Lab 8 Inspect and test fusible links, circuit breakers, and fuses
Digital Lab Explanation	Lab 9 Inspect and test switches, connectors, relays, solenoid solid state devices and wires
Module Breakdown	Lab 10 Demonstrate knowledge of the causes and effects from shorts to grounds
Module 1 Labs	Checkpoint Meeting Module 1
Module 2 Labs	Elec II Classroom CH 3 Reading: Computer Systems
Module 3 Labs	Elec II Classroom Chapter 3 Video and Questions: Transistor Review
Module 4 Labs	Elec II Classroom Chapter 3 Image Labeling Activity: Transistor or Parts Identification
Module 5 Labs	Elec II Classroom Chapter 3 Fill-in-the-Blank Questions
Module 6 Labs	Elec II Classroom Chapter 3 Multiple-Choice and True-False Questions
Module 7 Labs	Using the Lab Scope Simulation
Module 8 Labs	Elec II Shop CH 3 Reading
Cleaning Labs	Testing BCM Power and Ground Circuits Simulation
Cleaning Lab 1	Elec II Shop CH 3 Photo Sequence 4: Identifying Bipolar Transistors
Cleaning Lab 2	Flashing the BCM Simulation
Cleaning Lab 3	Elec II CH 3 Photo Sequence 5: Computer Flashing
Cleaning Lab 4	Elec II Shop Chapter 3 ASE-Style Review Questions
Cleaning Lab 5	Elec II Shop Chapter 3 ASE Challenge Questions
Elec II Classroom Chapter 1 Reading	Testing Relays Simulation
Testing Batteries Simulation	Using an Ammeter Simulation
Elec II Classroom Chapter 1 Multiple-Choice and True-False Questions	Lab 11 Use wiring diagrams during diagnosis/troubleshooting of electrical/electronic circuits
Elec II Classroom Chapter 1 Fill-in-the-Blank Questions	Lab 12 Demonstrate the proper use of a digital multimeter when measuring resistance
Elec II Classroom Chapter 1 Image Labeling Activity 1	
Computer Controlled Cooling Fan Control Circuit	
Elec II Shop Reading	
Elec II Shop Chapter 1 ASE-Style Review Questions	
Elec II Shop Chapter 1 Image Labeling Activity: Hybrid Transaxle Parts ID	
Elec II Shop Photo Sequence 2: Removing the Air Bag Module	
Elec II Shop Chapter 1 Video #1 and Questions: Hybrid Safety	
Elec II Classroom CH 2 Reading: Practical Theories and Laws	
Elec II Classroom Chapter 2 Image Labeling Activity 1: Structure of an Atom	
Elec II Classroom Chapter 2 Image Labeling Activity 2: Identify gear speed relationships	
Elec II Classroom Chapter 2 Fill-in-the-Blank Questions	

Lab 13 Check electrical circuits with a test light

Lab 14 Measure source voltage and perform voltage drop tests

Lab 15 Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical circuits.

Lab 16 Inspect and test switches, connectors, relays, solenoid solid state devices and wires

Lab 17 Perform solder repair of electrical wiring

Checkpoint Meeting Module 2

Elec II Chapter 4: Vehicle Communication Networks/
Diagnosing Vehicle Communication Systems

Elec II CM Chapter 4 Reading: Vehicle Communication Networks

Elec II CM Chapter 4 Fill-in-the-Blank Questions

Elec II CM Chapter 4 Multiple-Choice and True-False Questions

Elec II CM Chapter 4 Image Labeling Activity: Fiber Optic System ID

Elec II CM Chapter 4 Video and Questions: Computer Network

Elec II SM Chapter 4 Reading: Diagnosing Vehicle Communication Systems

Elec II SM Chapter 4 ASE-Style Review Questions

Elec II SM Chapter 4 ASE Challenge Questions

Elec II SM Chapter 4 Image Labeling Activity

Elec II SM Chapter 4 Video and Questions: Diagnosing Network Communication Problems

Elec II SM Photo Sequence 6: Advanced Scan Tool Function Voltage Drop Testing Simulation

Testing For Shorts Simulation

Testing For Opens Simulation

Lab 18 Check continuity and measure resistance in electrical circuits

Lab 19 Check electrical circuits using fused jumper wires

Lab 20 Inspect and test fusible links, circuit breakers, and fuses

Lab 21 Replace electrical connectors and terminal ends

Lab 22 Repair wiring harness

Lab 23 Check electrical/electronic waveforms: interpret readings and determine needed repairs

Lab 24 Repair wiring harness (including CAN/BUS systems)

Lab 25 Check for module communication errors (including CAN/BUS systems) using a scan tool

Lab 26 Demonstrate knowledge of the causes and effects from shorts to grounds

Checkpoint Meeting Module 3

Elec I CM Chapter 13 Reading: Electrical Accessory Systems Multispeed Blower Circuit Operation Simulation

Elec I CM Chapter 13 Video and Questions 1: Blower Motor Control

Elec I CM Chapter 13 Video and Questions 2: Vehicle Security Systems

Elec I CM Chapter 13 Labeling Activity 1: Horn Parts ID

Elec I CM Chapter 13 Labeling Activity 2: Adjustable Pedal System ID

Elec I CM Chapter 13 Fill-in-the-Blank Questions

Elec I CM Chapter 13 Multiple-Choice and True-False Questions

Elec I SM CH 13 Reading: Electrical Accessories Diagnosis and Repair

Elec I SM Photo Sequence 28: Wiper Motor Removal

Elec I SM Photo Sequence 29: Inspection of Rain Sensor Module

Elec I SM Photo Sequence 30: Typical Procedure for Grid Wire Repair

Elec I SM Photo Sequence 31: Typical Procedure for Replacing the Cruise Control Servo Assembly

Elec I SM Chapter 13 ASE-Style Review Questions

Elec I SM Chapter 13 ASE Challenge Questions

Lab 27 Diagnose incorrect horn operation

Lab 28 Diagnose incorrect wiper operation, diagnose wiper speed control and park problems

Lab 29 Diagnose incorrect washer operation

Lab 30 Diagnose incorrect operation motor-driven accessory circuits

Lab 31 Diagnose incorrect heated glass, mirror, or seat operation

Lab 32 Diagnose incorrect electric lock operation

Lab 33 Diagnose the cause(s) of failure, intermittent, or no operation of anti-theft systems

Lab 34 Describe the operation of keyless entry/ remote-start systems

Checkpoint Meeting Module 4

Elec I CM CH 15 Reading: Passive Restraint and Vehicle Safety Systems

Elec I CM Chapter 15 Labeling Activity 1: Airbag system component locations

Elec I CM Chapter 15 Labeling Activity 2: Drivers airbag parts ID

Elec I CM Chapter 15 Labeling Activity 3: Airbag igniter parts ID

Elec I CM Chapter 15 Labeling Activity 4: Hybrid inflator module parts ID

Elec I Chapter 15 Fill-in-the-Blank Questions: Passive Restraint and Vehicle Safety Systems

Elec I Chapter 15 Multiple-Choice and True-False Questions: Passive Restraint and Vehicle Safety Systems

Elec I SM CH 15 Reading: Servicing Passive Restraint and Vehicle Safety Systems

Elec I SM Chapter 15 Labeling Activity: Occupant Classification System parts ID

Elec I SM Photo Sequence 36: Occupant Classification Validation

Elec I SM Chapter 15 Video and Questions: Disarming an airbag system

Elec I SM Chapter 15 ASE-Style Review Questions: Servicing Passive Restraint and Vehicle Safety Systems

Elec I SM Chapter 15 ASE Challenge Questions: Servicing

Passive Restraint and Vehicle Safety Systems
 Elec II CM Chapter 5 Reading: Supplemental Air Bag Systems
 Elec II CM Chapter 5 Image Labeling Activity 1: Passenger Classification System ID
 Elec II CM Chapter 5 Image Labeling Activity 2: SRS Module Component ID
 Elec II CM Chapter 5 Multiple-Choice and True-False Questions: Supplemental Air Bag Systems
 Elec II CM Chapter 5 Fill-in-the-Blank Questions: Supplemental Air Bag Systems
 Elec II SM Chapter 5 Reading: Supplemental Air Bag Systems Diagnosis
 Elec II SM Chapter 5 Image Labeling Activity: SRS Hybrid Inflator Parts ID
 Elec II SM CH 5 Photo Sequence 8: Using the Airbag Simulator Load Tool
 Elec II SM Chapter 5 ASE-Style Review Questions: Supplemental Air Bag Systems Diagnosis
 Elec II SM Chapter 5 ASE Challenge Questions
 Lab 35 Diagnose incorrect horn operation
 Lab 36 Diagnose incorrect wiper operation, diagnose wiper speed control and park problems
 Lab 37 Diagnose incorrect washer operation
 Lab 38 Diagnose (troubleshoot) supplemental restraint system (SRS) problems
 Lab 39 Disable and enable an airbag system for vehicle service; verify indicator lamp operation
 Lab 40 Disable and enable an airbag system for vehicle service; verify indicator lamp operation
 Lab 41 Check for module communication errors (including CAN/ BUS systems) using a scan tool
 Checkpoint Meeting Module 5
 CM Chapter 6 Reading: Driver and Passenger Comfort Systems
 CM Chapter 6 Image Labeling Activity 1
 CM Chapter 6 Image Labeling Activity 2
 CM Chapter 6 Multiple-Choice and True-False Questions: Driver and Passenger Comfort Systems
 CM Chapter 6 Fill-in-the-Blank Questions: Driver and Passenger Comfort Systems
 SM Chapter 6 Reading: Driver and Passenger Comfort Systems Diagnosis
 SM Chapter 6 Image Labeling Activity: Solenoid Scope Waveform ID
 Using the Voltmeter
 Using an Ohmmeter
 SM Photo Sequence 9: Testing the Peltier Element Circuit
 SM Chapter 6 ASE-Style Review Questions: Driver and Passenger Comfort Systems Diagnosis
 Chapter 6 ASE Challenge Questions: Driver and Passenger Comfort Systems Diagnosis
 Lab 42 Use wiring diagrams during diagnosis/ troubleshooting of electrical/electronic circuits
 Lab 43 Check electrical circuits using fused jumper wires

Lab 44 Diagnose the cause of incorrect operation of warning devices and other driver information systems
 Lab 45 Diagnose incorrect operation motor-driven accessory circuits
 Lab 46 Diagnose incorrect electric lock operation
 Lab 47 Diagnose incorrect operation of cruise control systems
 Lab 48 Remove and reinstall door panel
 Checkpoint Meeting Module 6
 CM Chapter 7 Reading: Electronic Stability and Rollover Mitigation Systems and Diagnosis
 Chapter 7 Image Labeling Activity 1
 Chapter 7 Image Labeling Activity 2
 CM Chapter 7 Fill-in-the-Blank Questions: Electronic Stability and Rollover Mitigation Systems and Diagnosis
 CM Chapter 7 Multiple-Choice and True-False Questions: Electronic Stability and Rollover Mitigation Systems and Diagnosis
 SM Chapter 7 Reading: Electronic Stability and Rollover Mitigation Systems and Diagnosis
 SM Chapter 7 ASE-Style Review Questions: Electronic Stability and Rollover Mitigation Systems and Diagnosis
 SM Chapter 7 ASE Challenge Questions: Electronic Stability and Rollover Mitigation Systems and Diagnosis
 Chapter 7 Image Labeling Activity
 Photo Sequence 10: Testing the Steering Angle Sensor
 CM Chapter 8 Reading: Driver Assistance Systems
 CM Chapter 8 Image Labeling Activity 1
 CM Chapter 8 Image Labeling Activity 2
 CM Chapter 8 Fill-in-the-Blank Questions: Driver Assistance Systems
 CM Chapter 8 Multiple-Choice and True-False Questions: SM CH 8 Reading: Driver Assistance Systems Diagnosis
 Photo Sequence 11: Self-Test of a MIC
 Photo Sequence 12: Bench Testing the Fuel Level Sender Unit
 SM Chapter 8 ASE-Style Review Questions: Driver Assistance Systems Diagnosis
 SM Chapter 8 ASE Challenge Questions: Driver Assistance Systems Diagnosis
 CM Chapter 9 Reading: Telematics and Radio Frequency - Operated Systems
 CM Chapter 9 Image Labeling Activity 1: Immobilizer System Component ID
 CM Chapter 9 Image Labeling Activity 2: Remote Keyless Entry System Component ID
 CM Chapter 9 Fill-in-the-Blank Questions: Telematics and Radio Frequency-Operated Systems
 CM Chapter 9 Multiple-Choice and True-False Questions: Telematics and Radio Frequency Operated Systems
 SM Chapter 9 Reading: Telematics and Radio Frequency-Operated Systems Service
 SM Chapter 9 Image Labeling Activity: AM Radio Parts ID
 SM Chapter 9 Photo Sequence 13: Bluetooth pairing test

SM Chapter 9 ASE-Style Review Questions: Telematics and Radio Frequency-Operated Systems Service
 SM Chapter 9 ASE Challenge Questions: Telematics and Radio Frequency-Operated Systems Service
 Lab 49 Check electrical/electronic waveforms: interpret readings and determine needed repairs
 Lab 50 Inspect and test gauges and gauge sending units
 Lab 51 Diagnose the cause of incorrect operation of warning devices and other driver information systems
 Lab 52 Diagnose incorrect operation of cruise control systems
 Lab 53 Diagnose (troubleshoot) radio static and weak, intermittent, or no radio reception
 Lab 54 Diagnose (troubleshoot) body electronic system circuits using a scan tool
 Lab 55 Diagnose the cause(s) of false, intermittent, or no operation of anti-theft systems
 Checkpoint Meeting Module 7
 CM Chapter Reading: Hybrid and Electric Vehicle Propulsion Systems
 General Hybrid Electric Vehicle Safety Simulation
 Preparing the HEV for Service Simulation
 CM Chapter 10 Image Labeling Activity: Integrated Starter Generator Parts ID
 CM Chapter 10 Video #1 and Questions: Electric Vehicle Design
 CM Chapter 10 Video #2 and Questions: Regenerative Braking
 CM Chapter 10 Video #3 and Questions: Hybrid Vehicles
 CM Chapter 10 Fill-in-the-Blank Questions: Hybrid and Electric Vehicle Propulsion Systems
 CM Chapter 10 Multiple-Choice and True-False Questions: Hybrid and Electric Vehicle Propulsion Systems
 SM Chapter 10 Reading: Hybrid and High-Voltage System Service
 SM Chapter 10 Video and Questions: Hybrid Safety
 SM Chapter 10 Image Labeling Activity: High Voltage Controller Parts ID
 SM Chapter 10 Photo Sequence 14: HEV High-Voltage Checkout Procedure
 SM Chapter 10 Photo Sequence 15: Using the Insulation Tester
 SM Chapter 10 Photo Sequence 16: Removing the HV Battery
 SM Chapter 10 ASE-Style Review Questions: Hybrid and High-Voltage System Service
 SM Chapter 10 ASE Challenge Questions: Hybrid and High-Voltage System Service
 Lab 57 Inspect and test gauges and gauge sending units
 Lab 58 Diagnose (troubleshoot) body electronic system circuits using a scan tool
 Lab 59 Verify operation of instrument panel gauges and warning / indicator lights; reset maintenance reminders
 Lab 60 Perform software transfers, software updates, or

flash reprogramming on electronic modules
 Lab 61 ID information needed and service requested on work order
 Lab 62 Demonstrate the use of the three C's (concern, cause and correction)
 Lab 63 Review vehicle history
 Lab 64 Complete a work order with all necessary information
 Lab 65 Ensure vehicle is prepared to return to customer per school/ company policy
 Checkpoint Meeting Module 8
 End of Course Survey
 Electrical Systems II Competency Profile (2021)
 Electrical 2 Final Review
 Electrical 2 Final Exam

Subject to change. Please consult your Canvas course for the most current instructions and updates.

Classroom Hours

Mo, Tu, W, Th
8:00 AM - 12:00 PM
1:00 PM - 5:00 PM

Friday
8:00 AM - 12:00 PM

For a full list of course hours visit: [Course Schedule](#)

Instructor Contact Information

Cody Dawson — cdawson@stech.edu
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Office Hours: By appointment

Email is the preferred method of communication; you will receive a response within 24 hours during regular business hours.

Canvas Information

Canvas is the where course content, grades, and communication will reside for this course.

- stech.instructure.com
- For Canvas passwords or any other computer-related technical support contact Student Services.
- For regular Hours and Weekdays call (435) 586 - 2899.
- For after Hours & Weekends call (435) 865 - 3929 (Leave a message if no response).

Course Policies

Course Grading: Students must achieve 80% (B-) or higher to pass graded work. Incomplete assignments must be redone to meet the required standards. Guidelines, rules, and expectations for completing assignments are provided in each course.

High School Power School Grades: Quarter student grades will be determined by student progress percentage. Faculty will use the higher percentage of either 1) quarter progress, or 2) cumulative progress for the current training plan year.

Grade Scale: The following grading scale will be used to determine a letter grade.

• A : 94 - 100%	• B : 83 - 86%	• C : 73 - 76%	• D : 63 - 66%
• A- : 90 - 93%	• B- : 80 - 82%	• C- : 70 - 72%	• D- : 60 - 62%
• B+ : 87 - 89%	• C+ : 77 - 79%	• D+ : 67 - 69%	• F : 0 - 59%

Course Policies: Class attendance is required during your scheduled time. Cell phones for many have become a distraction. When you are in class or lab we encourage you to keep your cell phones put away in a secure location. If you use ear buds we ask that you only use one so you can still hear the things going on around you. If you are using your phone for things other than school related items, instructors will ask you to put them away. Please follow the direction of your instructors. Those who have been asked to refrain from using your cell phone and fail to do so will be asked to meet with the Director of Transportation and student services will be notified. The program is designed to provide the student with as much hands-on work as possible. In the automotive industry you may be required to lift heavy objects and stand for hours at a time to complete work required. Technicians deal with chemicals and materials which require caution, these will be identified in the Right to Know Agreement provided to you. You will also be required to use computers to track and complete work.

Additional Information

InformaCast Statement: Southwest Tech uses InformaCast to ensure the safety and well-being of our students. In times of emergency, such as weather closures and delays, this app allows us to promptly deliver notifications directly to your mobile devices. To stay informed and receive real-time updates, we encourage all students to sign up for notifications. Your safety is our priority, and staying connected ensures a swift response to any unforeseen circumstances. More information and directions for signing up are available at: <https://stech.edu/emergency-notifications/>

Internet Acceptable Use Policy: The student is expected to review and follow the Southwest Technical College Internet Safety Policy at: <https://stech.edu/students/policies/>

Student Code of Conduct Policy: The student is expected to review and follow the Southwest Technical College Student Code of Conduct Policy at: <https://stech.edu/students/policies/>

Accommodations: Students with medical, psychological, learning, or other disabilities desiring accommodations or services under ADA, must contact the Student Services Office. Student Services determines eligibility for and authorizes the provision of these accommodations and services. Students must voluntarily disclose that they have a disability, request an accommodation, and provide documentation of their disability. Students with disabilities may apply for accommodations, based on an eligible disability, through the Student Services office located at 757 W. 800 S., Cedar City, UT 84720, and by phone at (435) 586-2899. No diagnostic services are currently available through Southwest Technical College.

Safety and Building Maintenance: The College has developed and follows a variety of plans to ensure the safe and effective operation of its facilities and programs. The following plans are available online:

1) Facilities Operations and Maintenance Plan; 2) Technical Infrastructure Plan; and 3) Health and Safety Plan.

Withdrawals and Refunds: Please refer to the Southwest Technical College Refund Policy at: <https://stech.edu/students/policies/>

Any high school or adult student, who declares a technical training objective is eligible for admission at Southwest Technical College (Southwest Tech). Program-specific admissions requirements may exist and will be listed on the Southwest Tech website. A high school diploma or equivalent is not required for admission but is mandatory for students seeking Title IV Federal Financial Aid.

Non-Discriminatory Policy: Southwest Technical College affirms its commitment to promote the goals of fairness and equity in all aspects of the educational enterprise, and bases its policies on the idea of global human dignity.

Southwest Tech is committed to a policy of nondiscrimination. No otherwise qualified person may be excluded from participation in or be subjected to discrimination in any course, program or activity because of race, age, color, religion, sex, pregnancy, national origin or disability. Southwest Technical College does not discriminate on the basis of sex in the education programs or activities that it operates, as required by Title IX and 34 CFR part 106. The requirement not to discriminate in education programs or activities extends to admission and employment. Inquiries about Title IX and its regulations to STECH may be referred to the Title IX Coordinator, to the Department of Education, and/or to the Office for Civil rights.

If you believe you have experienced discrimination or harassment on our campus, please contact the Title IX Coordinator, Cory Estes: cestes@stech.edu, (435) 865-3938.

For special accommodations, please contact the ADA Coordinator, Cyndie Tracy: ctracy@stech.edu, (435) 865-3944.

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