SOUTHWEST TECH
SOUTHWEST TECHNICAL COLLEGE

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.

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

Textbook & Reading Materials

Cengage Unlimited (1 year subscription), Cengage

Assignments and Assessments

Orientation
Orientation Acknowledgement
Electrical Systems II Syllabus 2021-22
Remind Txt Group
STECH Auto Student Information Sheet
Automotive Student OE Instructions
STECH COVID-19 Policies and Prooedures Agreement Review
STECH Auto Right-To-Know Agreement
SWAM 1530 Electrical Systems II Lab Assignment Checklist Review
Cleaning Expectations
Southwest Technical College Automotive Video Playlist
Student Tool and Equipment Use Waiver
Cell Phone
Digital Lab Assignment Switch Instructions
Digital Lab Explanation
Module Breakdown
Module 1 Labs
Module 2 Labs
Module 3 Labs
Module 4 Labs
Module 5 Labs
Module 6 Labs
Module 7 Labs
Module 8 Labs
Cleaning Labs
Cleaning Lab 1
Cleaning Lab 2
Cleaning Lab 3
Cleaning Lab 4
Cleaning Lab 5
Elec II Classroom Chapter 1 Read ing
Testing Batteries Simulation
Elec II Classroom Chapter 1 Multiple-Choice and True-False Questions
Elec II Classroom Chapter 1 Fill-in-the-Blank Questions
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 Safe.ty
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
Elec II Classroom Chapter 2 Multiple-Choice and True-False Questions
Elec II Shop CH 2 Reading: Special Tools and Procedures
Elec II Shop Chapter 2 Image Labeling Activity: Graphing Meter/ Scope Screen Identification
Elec II Shop Chapter 2 Video and Questions: Scan Tools
Using the Scan Tool Simulation
Reading Wiring Diagrams Simulation
Soldering Copper Wire Simulation
Elec II Shop Chapter 2 ASE-Style Review Questions
Lab 1 Research applicable vehicle arnd service information
Lab 2 Use wiring diagrams to t race electrical/electronic circuits
lab 3 Demonstrate the orooer use of a di2ital multimeter when measurin2 source voltage and voltage drops, including grounds
Lab 4 Demonstrate the proper use of a digital multimeter when measuring current flow
Lab 5 Check elect rical circuits with a test light
Lab 6 Measure source voltage and perform voltage drop tests
Lab 7 Check continuity and measure resistance in electrical circuits
Lab 8 Inspect and test fusible links, circuit breakers, and fuses
Lab 9 Inspect and test switches, connectors, relays, solenoid solid state devices and wires
Lab 10 Demonstrate knowledge of t he causes and effects from shorts to grounds
Checkpoint Meeting Module 1
Elec II Classroom CH 3 Reading: Computer Systems
Elec II Classroom Chapter 3 Video and Questions: Transistor Review
Elec II Classroom Chapter 3 Image Labeling Activity: Transist or Parts Identification
Elec II Classroom Chapter 3 Fill-in-the-Blank Questions
Elec II Classroom Chapter 3 Multiple-Choice and True-False Questions
Using the Lab Scope Simulation
Elec II Shop CH 3 Reading
Testing BCM Power and Ground Circuits Simulation
Elec II Shop CH 3 Photo Sequenc,e 4: Identifying Bipolar Transistors
Flashing t he BCM Simulation
Elec II CH 3 Photo Sequence 5: Computer Flashing
Elec II Shop Chapter 3 ASE-Style Review Questions
Elec II Shop Chapter 3 ASE Challenge Questions
Testing Relays Simulation
Using an Ammeter Simulation
Lab 11 Use wiring diagrams during d iagnosis/troubleshooting of electrical/electronic circuits
Lab 12 Demonstrate t he proper use of a digital multimeter when measuring resistance

Lab 13 Check elect rical 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, connect ors, 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 Challen:ge 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 elect rical 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 elect rical/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 Demonst rate knowledge of t he causes and effects from shorts to grounds ..... .
Checkpoint Meeting Module 3
Elec I CM Chapter 13 Reading: Electrical Accessory Systems
Multisp eed 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 W1ire Repair
Elec I SM Photo Sequence 31: Typical Procedure for Replacing the Cruise Control Servol 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 cfrcuits
Lab 31 Diagnose incorrect heated glass, mirror, or seat operation
Lab 32 Diagnose incorrect electric lock operation
Lab 33 Diagnose the cause(s) of fa lse, 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 intlator 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 Rest raint 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 lntlator Parts ID
Elec II SM CH 5 Photo Sequence 8: Using t he Airbag Simulator Load Tool
Elec II SM Chapter 5 ASE-Style Review Questions: Supplemental Air Bag Systems Diagnosis
Elec II SM Chapter 5 ASE Challen:ge Questions
Lab 35 Diagnose incorrect horn operation
Lab 36 Diagnose incorrect wiper operation, diagnose wiper speed cont rol 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 operatiorn
Lab 40 Disable and enable an airbag system for vehicle service; verify indicator lamp operatiorn
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-t he-Blank Questions: Driver and Passe·nger 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 d iagnosis/ t roubleshooting of electrical/electronic circuits
Lab 43 Check elect rical circuits using fused jumper wires
Lab 44 Diagnose the cause of incorr,ect operation of warning devices and other driver information systems
Lab 45 Diagnose incorrect operation motor-driven accessory cfrcuits
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-t he-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-t he-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 SO 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 fa lse, 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: Elect ric 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 warnirng / 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 will 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
Shad Esplin — sesplin@stech.edu
Dallin Robinson — drobinson@stech.edu
McKael Stapel — mstapel@stech.edu

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

Class attendance is required, this is not an online course. Attendance is required during your scheduled time.
Grade Scale — A: 100 - 90%, B: 89 - 80%, F: 79% or lower.
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.

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. The progress percentage will be used with the grading scale to determine the minimum grade. High School Grade Scale: The following grading scale will be used to determine a letter grade from the progress percentage:

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

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.
Southwest Technical College
757 West 800 South
Cedar City, UT 84720
info@stech.edu
(435) 586-2899