

**Odessa College  
Technical Studies Division  
Automotive Technology**

**Course Syllabus**

**COURSE NUMBER:** AUMT 1407 – DEMR 1405  
**COURSE TITLE:** Automotive Electrical Systems -- Basic Electrical  
**CREDIT HOURS:** 4      **LECTURE HOURS:** 2      **LAB HOURS:** 6  
**PREREQUISITE:** Consent of department chair or instructor.

**CATALOG DESCRIPTION:**

An overview of automotive electrical systems including topics in operational theory, testing, diagnosis, and repair of batteries, charging and starting systems, and electrical accessories. Emphasis on electrical schematics diagrams and service manuals. May be taught manufacturer specific. Presents elementary to most advanced electrical systems. Emphasizes testing diagnostic procedures. The student will use manuals and computer test equipment to test and diagnose electrical problems. The student will know the relation of Ohms Law as it applies to the automotive electrical systems. The student will gain work experience working as a team on lab projects and develop communication skills for customer relations. The reading of technical materials is required. Lab fee required. (SCANS 1, 2, 3, 5, 6, 7, 8, 9, 10, 11)  
Prerequisite: Consent of department chair or instructor.

**COURSE LEARNING OUTCOMES:**

Explain electrical principles; describe battery, starting system, and charging system operation and theory; determine the proper use of electrical test equipment; and explain the use of electrical schematics and symbols.

**COMPETENCIES:**

After completing this course, the student should be able to demonstrate automotive competency in:

**VI. ELECTRICAL/ ELECTRONIC SYSTEMS**

**TEXTBOOK**

Classroom Manual: Automotive Electricity & Electronics, Barry Hollembeak, 4<sup>th</sup> Edition, Thomson Delmar Learning, 2007

**SUPPLIES:**

Students will need course textbook, job sheets, paper, notebook, pen and pencils.

**COURSE GRADE EVALUATION:**

25% Professionalism (*A grade will be assessed using the following guide lines:*)  
Punctuality  
Desire to learn  
Appropriate appearance  
Quality workmanship  
Ability to work with others  
Safe working habits (*Students will be graded in all areas of shop safety.*)  
Positive attitude  
Work ethics  
Integrity  
Attendance  
25% Research Paper and/or Final Exam  
25% Lab Participation  
25% Quizzes and/or Daily Task (*Quizzes maybe verbal/written*)

Also see instructor information sheet:

**ATTENDANCE POLICY:**

Students are expected to attend all classes in which they are enrolled. The college requires instructors to keep accurate student attendance records; therefore, any student who must be absent from class for any reason should immediately consult with his/her instructor regarding the absence. **YOUR** attendance is the greatest predictor of your success. **Student attendance at EVERY class is expected.** You should expect that each absence will adversely affect your course grade. (*For more information, refer to the catalog section; Academic and Class Information, currently on page 42 in the 2009-2011 catalog.*)

**ACADEMIC ETHICS:**

You are expected to participate and contribute as a group in the labs and classroom; test will be taken without notes or other outside-assistance. If unethical behavior is detected, all parties involved will be denied credit for that project or exam. The questioned material and report of the ethics violation will be submitted to the department chair for further action if deemed necessary.

**STUDENT ASSISTANCE:**

- Admissions: 432-335-6432
- Auto/Diesel Department Chair: 432-335-6633
- Book Store: 432-335-6655
- Cafeteria: 432-335-6435
- Career Services: 432-335-6433
- Cashier's: 432-335-6419
- Counseling: (Help center) 432-335-6433
- Rosie Aguilar 432-335-6741
- Dollars for Scholars 432-335-6648
- .edu: (Student Service Center) 432-335-6894
- Financial Services: 432-335-6429
- Housing/Judicial Affairs: 432-335-6300
- Learning Resources Center: 432-335-6640
- Office of Disability Services 432-335-6861

*What a student with a documented disability must do to obtain services*

A student with a documented disability planning to attend classes and needing to request accommodations must present the appropriate documentation to the Office of Disability Services, located in the Student Union Building/ Help Center. It is recommended that the student meet with the Special Populations advisor three weeks prior to the beginning of the semester to make the necessary arrangements for the needed accommodations. Please call Becky at 335-6861 or send an email to

[brivera@odessa.edu](mailto:brivera@odessa.edu) for additional information or to make an appointment.

- Phi Theta Kappa 432-335-6533
- Registrar: 432-335-6404
- Sports Center 432-335-6476
- Student Learning Center:
  - Peer tutoring available
  - PLATO: Computer tutoring available
  - (LRC 300) 432-335-6673
- Student Support Services: 432-335-6476
- Technical Studies Dean: 432-335-6686
- Testing Center: 432-335-6620
- Vice President Instruction: 432-335-6413
- Vice President for Student Services:
  - 432-335-6684
- Wi-Fi Java, Cyber Café: 432-335-6891
- Wrangler Express Center 432-335-6849

**FACULTY:**

James McCutcheon, chair;	Office Dm102	432-335-6633	<a href="mailto:jmccutcheon@odessa.edu">jmccutcheon@odessa.edu</a>
Jerry Griffith	Office Dm101	432-335-6632	<a href="mailto:jgriffith@odessa.edu">jgriffith@odessa.edu</a>
Perry Griffith	Office Dm105A	432-335-6603	<a href="mailto:pgriffith@odessa.edu">pgriffith@odessa.edu</a>

**LAB REQUIREMENTS:**

**General Shop Practices and Procedures**

- **Safety requirements will be strictly enforced: comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, proper ventilation, and the handling, storage, and disposal of chemicals in accordance with local, state, and federal environmental regulations.**
- Proper **Personal Protection Equipment (PPE)** will be used in all required areas.
- **Safety Glasses** must be worn **at all times** in the **lab/shop area**. No exceptions!
- **Adhere to all Safety signs** posted on equipment, fire extinguishers, tool groups, vehicle lifts, support stands, grinders, drill presses, or any other equipment or areas marked with Safety signage.
- Do not restrict the passage of any marked walkway.
- **Safety is paramount** and you are responsible for your work area and your safe work habits! **Therefore, do not leave fluid spills on floor and keep your area free of clutter!**
- Equipment use is limited to those knowledgeable enough to operate the equipment safely; otherwise the equipment is **OFF LIMITS!** (**Consult your instructor**).
- Tools and equipment **will not be loaned** or taken from the Odessa College premises.
- Students **MUST** sign out for any specialty tool needed and will only be issued by an instructor or designated person. The student will be **responsible for safety and care of those tools, when finished or at the end of each lab period**, return all tools to the checkout person so they can sign the tool back in.
- NATEF job sheets will be filled out for each lab assignment. When finished, give completed job sheets to the instructor and those will be recorded on your progress report.
- All vehicles are to be treated as customer vehicles. As a student **YOU ARE TO RESPECT THIS**, do not sit in, lean on, or handle any vehicle that has not been specifically assigned to you by your instructor.
- Any time a vehicle hood is open, fender covers must be in place on the fenders at all times.
- Students must get approval from the instructor **before** bringing vehicles in the shop. **Only certain vehicles qualify for NATEF required tasks.**
- Visitors are not allowed in the lab/shop area, however they may be escorted through the lab/shop area by approved personal.

**COURSE COMPETENCIES:**

**NATEF RECOMMENDED TASKS FOR AUTOMOTIVE TECHNOLOGY**

**AUTOMOTIVE ELECTRONICS**

*For every tasks in Automotive Electronics, the following safety requirement must be strictly enforced as a number 1 priority: Comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and handling, storage and disposal of chemicals in accordance with local, state, and federal safety and environmental regulations, listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.*

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**VIA General Electrical System Diagnosis**

Task	Job Sheet	Priority	
A.1	1	P1	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
A.2	2	P1	Identify and interpret electrical/ electronic system concern; determine necessary action.
A.3	3	P1	Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.
A.4	3	P1	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
A.5	4	P1	Diagnose electrical/electronic integrity for series, parallel & series-parallel circuits using principles of electricity (Ohm's Law).
A.6	5	P1	Use wiring diagrams during diagnosis of electrical circuit problems.
A.7	6	P1	Demonstrate the proper use of a digital multi-meter (DMM) during diagnosis of electrical circuit problems.
A.8	7	P2	Check electrical circuits with a test light; determine necessary action.
A.9	8	P1	Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.
A.10	9	P1	Measure current flow in electrical/ electronic circuits and components using an ammeter; determine necessary action.
A.11	10	P1	Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.
A.12	11	P2	Check electrical circuits using jumper wires; determine necessary action.
A.13	12	P2	Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
A.14	9	P1	Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.
A.15	13	P1	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
A.16	11	P1	Inspect and test switches connectors, relays, and wires of electrical/electronic circuits; perform necessary action.
A.17	14	P1	Remove and replace terminal end form connector.
A.18	14	P1	Repair connectors and terminal ends.
A.19	14	P1	Repair wiring harness (including CAN/BUS systems).
A.20	15	P1	Perform solder repair of electrical wiring.
A.21	16	P3	Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.

**VIB Battery Diagnosis and Service**

B.1	17	P1	Perform battery state-of-charge test; determine necessary action.
B.2	17	P1	Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action.
B.3	18	P1	Maintain or restore electronic memory functions.
B.4	19	P1	Inspect, clean, fill and replace battery.
B.5	20	P2	Perform slow/fast battery charge.
B.6	19	P1	Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
B.7	21	P1	Start a vehicle using jumper cables and a battery or auxiliary power supply.
B.8	16	P3	Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.
B.9	22	P2	Identify electronic module, security systems / radios that require reinitialization/ code entry following battery disconnect
B.10	23	P3	Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures

**VIC Starting System Diagnosis and Repair**

C.1	24,26	P1	Perform starter current draw tests; determine necessary action.
C.2	24	P1	Perform starter circuit voltage drop tests; determine necessary action.
C.3	24	P2	Inspect and test starter relays and solenoids; determine necessary action
C.4	25,28	P1	Remove and install starter in a vehicle.
C.5	27	P2	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.
C.6	29	P2	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.

**VLD Charging System Diagnosis and Repair**

D.1	30	P1	Perform charging system output test; determine necessary action.
D.2	30,32	P1	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.
D.3	31	P1	Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.
D.4	33,34	P1	Inspect and test voltage regulator/ regulating circuit; perform necessary action.
D.5	30	P1	Remove, inspect, and install generator (alternator).

**VLE Lighting Systems Diagnosis and Repair**

Task	Job	Priority
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Sheet

E.1	35	P1	Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.
E.2	36	P2	Inspect, replace, and aim headlights and bulbs.
E.3	35	P2	Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.

**VI.F Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair**

F.1	38	P1	Inspect and test gauges and gauge sending units for cause of intermittent, high, low or no gauge readings; determine necessary action.
F.2	39	P3	Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.
F.3	40	P1	Diagnose the cause of incorrect operation of warning devices/other driver information system determine necessary action
F.4	41	P3	Inspect and test sensors, connectors, and wires of electronic digital instrument circuits; determine necessary action.

**VI.G Horn and Wiper/washer Diagnosis and Repair**

G.1	42	P2	Diagnose incorrect horn operation; perform necessary action.
G.2	43	P2	Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.
G.3	44	P2	Diagnose incorrect washer operation; perform necessary action.

**VI.H Accessories Diagnosis and Repair**

H.1	45	P2	Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.
H.2	46	P2	Diagnose heated glass, mirror, or seat operation; determine necessary action.
H.3	47	P2	Diagnose incorrect electric lock operation; determine necessary action.
H.4	48	P3	Diagnose incorrect operation of cruise control systems; repair as needed.
H.5	49	P1	Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (Note: Follow manufacturer's safety procedures to prevent accidental deployment.)
H.6	50	P1	Disarm and enable the airbag system for vehicle service
H.7	51	P3	Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action.
H.8	52	P1	Remove and reinstall door panel.
H.9	53	P2	Diagnose body electronic system circuits using a scan tool; determine necessary action.
H.10	53	P3	Check for module communication errors using a scan tool.
H.11	54	P2	Diagnose the cause of false, intermittent, or no operation of anti-theft system.