# AUTOMOTIVE ELECTRICAL/ELECTRONICS FUNDAMENTALS (II)

## Course Syllabus

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| **Course Number:** | EL102 | **Instructor:** | Ron Rader |
| **OCAS Code:** | | **Phone Number:** | 580-327-0344 |
| **Course Length:** | 90 hours | **Email:** | rrader@nwtech.edu |
| **Career Cluster:** | Transportation | **Campus:** | Alva, OK |
| **Career Pathway:** | Automotive Service | **Program:** | Automotive Service Technology |

**Career Major:** Automotive Service Technician, Automotive Chassis Technician, Automotive Maintenance Light Repair Technician, Air Conditioning Technician, Automotive Drivability Technician

**Pre-requisite:** Automotive Introduction, Automotive Electrical/Electronics Introduction

**Course Description:** In this Electrical/Electronics course the students will study general electrical system diagnosis. Students will learn to check voltage drop on circuits, locate shorts, test grounds, test relays and circuit breakers then determine necessary action. Students will learn to diagnose and repair starting systems, charging systems as well as horn and windshield wiper systems. Students will also learn to diagnose and repair lighting circuits, sockets and controllers. Also covered in this course will be gauges, warning devices, driver's information system and sending units for gauges.

**Instructional Philosophy:** To provide a training program that is of merit both educationally and ethically while effectively providing the individual learner the opportunities, knowledge and skills necessary to succeed in the workplace as well as life.

**Course Goals:** Upon successful completion of this course, the student will be able to:

**Competencies:**
General Electrical System Diagnosis
Use wiring diagrams during diagnosis of electrical circuit problems.
Check voltage and voltage drop in electrical/electronic circuits using a digital multi-meter (DMM); determine necessary action.
Check electrical circuits using jumper wires; determine necessary action.
Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action
Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action.
Inspect and test fusible links, circuit breakers, and fuses; determine necessary action
Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; perform necessary action
Battery Diagnosis and Service
Maintain or restore electronic memory functions
Lighting Systems Diagnosis and Repair
Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action
Horn and Wiper/Washer Diagnosis and Repair
Diagnose incorrect horn operation; perform necessary action
Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.
Diagnose incorrect windshield washer operation; perform necessary action.

Charging System Diagnosis and Repair

Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions

Inspect and test voltage regulator/regulating circuit; perform necessary action

Remove, inspect, and install generator (alternator)

Disassemble generator (alternator), clean, inspect, and test components; determine necessary action. Perform charging circuit voltage drop tests; determine necessary action

Starting System Diagnosis and Repair

Perform starter circuit voltage drop tests; determine necessary action

Inspect and test starter relays and solenoids; replace as needed

Remove and install starter

Perform starter bench tests; determine necessary action

Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action Disassemble, clean, inspect, and test starter components; replace as needed

Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair

Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action

Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action

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| **Major Course Projects:** | Students will perform tasks relating to the Automotive Service Industry as per standards identified by the National Automotive Technicians Education Foundation (NATEF). Students will complete repair orders each day and will document completion of competencies on competency profiles tracking individual progress and accomplishment. |
| **Project Outline:** | Projects will include performing tasks on mock ups, shop vehicles, and live work as student skills progress. These projects will reinforce classroom theory instruction and will require the student to consult industry service information during the course of task performance. |
| **Instructional Delivery Plan:** | The instruction for this course will be comprised of multiple methods designed to promote and accommodate different learning styles including classroom lecture, classroom demonstrations, shop demonstrations, hands on learning activities, classroom discussion, interactive media, textbook, computer based learning activities, research projects, guest speakers, student presentations, and interactive learning with CPS (Classroom Performance System). Students will be required to practice the skills associated with the instructional content and will be required to work independently and also in teams. Assignments will require students to use academic skills in math, science, and language arts. |
| **Assessment Plan:** | Students will be assessed according to three basic kinds of learning. Knowledge: Does the student possess the required knowledge to perform a specific competency? Skills: Does the student possess the necessary coordination to perform the task/competency? Attitude: Will the student perform the task/competency on the job after learning to do it? Students will also be assessed according to the basic work skills of attendance and promptness. Soft skills will be assessed in the Academic Career Center. |

        50%        Daily work- Performance of technical skills on job, work habits, safety, clean-up, participation

        50%        Written assignment- Repair orders, textbook assignments, etc.

Grading Scale:
A    90-100    Exceeds expectations
B    80-89    Meets industry standards and expectations
C    70-79    Passing grade, but does not meet some standards
D    60-69    Passing, but only meets the minimum standards
F    Below 60 Failing, does not meet minimum standards

**Alliance Credit Offered:** OSU Okmulgee

**Industry Alignments:** ASE Certification, ODCTE Certification,

**End of Instruction Industry Assessment:** ASE Certification, ODCTE Certification,

**Resources:**
Automotive Excellence Vol. 1 and Vol. 2
Modern Automotive Technology
Introduction to Automotive Service: Fundamental Concepts
CDX Global Interactive Training
Snap On Shop Key
Alldata

**Attachments:** See Automotive Service Technology Task List Competency Handbook