

MTRK 156A: MEDIUM/ HEAVY TRUCK ELECTRICAL/ ELECTRONIC SYSTEMS I

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2022
Credits:	5
Total Contact Hours:	132
Lecture Hours :	72
Lab Hours:	60
Hours Arranged:	0
Outside of Class Hours:	144
Prerequisite:	MTRK 148 (or concurrent enrollment) or MTRK 101 (or concurrent enrollment) or AUTO 101 (or concurrent enrollment) or by department consent based upon individual's experience and ASE certifications or manufacturer certifications.
Strongly Recommended:	MATH 144.
Transferable to CSU:	Yes
Transferable to UC:	No
Grading Method:	Standard Letter

Catalog Course Description

Intended for those seeking a career in the medium and heavy duty truck service and repair industry, this is the first of the electrical series in the MTRK program. This class covers essential electrical and electronic systems theory, along with inspection, diagnosis, service and repair of specific electrical systems including the battery, starting systems, charging systems, lighting systems, gauges, and instrument-panel warning lights. Prepares students for ASE Electrical & Electronic Systems (T6) certification. 72 lecture hours, 60 lab hours.

Course Objectives

- Demonstrate knowledge of the basic layout and location of vehicle electrical components.
- Distinguish the variances in electrical system designs and implementations from various manufacturers and designers.
- Perform electrical system and component inspection practices as outlined by industry standards and governmental agency regulations.
- Perform procedural repair practices of electrical system components as outlined by industry standards.
- complete ninety-five percent (95%) of Priority 1 (P-1), seventy percent (70%) of Priority 2 (P-2) and twenty-five percent (25%) of Priority 3 (P-3) as required by the National Automotive Technician Education Foundation (NATEF) objectives for Electrical (T6) that apply to first level electrical. Please see NATEF objectives (pages 50-58) or www.natef.org for the most current objectives.
- Perform electrical system diagnostic procedures as outlined by industry standards

Major Course Content

1. Electrical and Electronic Systems Theory
 - a. Electrical Principles
 - i. Ohm's Law
 - ii. Watt's Law
 - iii. Series, Parallel, and Series-Parallel Circuits
 - iv. Switches & Relays
 - v. Electrical Diagnostic Tools (DMMs, test lights, fused jumper wires)
 - vi. Wiring Diagrams
 - b. Electronic Principles
 - i. Semi-Conductors & Doping
 - ii. Diodes & Zener Diodes
 - iii. Transistors
 - iv. Solid-State Voltage Regulators
 - v. Solid-State AC-to-DC Rectification
 - c. Vehicle Electrical Systems Theory & Diagnosis
 - i. Battery
 - ii. Starting Systems
 - iii. Charging Systems
 - iv. Lighting Systems (headlights, brake & tail lights, turn signals)
 - v. Gauges
 - vi. Instrument Panel Warning Lights
 - d. Electrical Systems Service & Repair
 - i. Service Precautions
 - ii. Wiring repair, soldering
 - iii. Starter motor R&R
 - iv. Alternator R&R
 - v. Instrument panel disassembly and inspection
 - e. Electrical Wiring Diagrams & Troubleshooting
 - i. Circuit tracing and analysis
 - ii. Basic electrical troubleshooting using EWDs
 - iii. Electrical current tracing using electrical schematics
 - iv. Manufacturer specific symbols and definitions
2. Service Literature
 - a. Repair manuals & wiring diagrams
 - b. Technical Service Bulletins
3. Electrical Safety
 - a. Electrical hazards and safety
 - b. Low and high voltage precautions

Lab Content

1. Electrical and Electronic Systems Theory
 - a. Electrical Principles
 - i. Perform Resistance, Voltage and Amperage Measurements
 - ii. Test Switches & Relays
 - b. Automotive Electrical Systems Theory & Diagnosis
 - i. Test & Evaluate Batteries
 - ii. Test & Evaluate Starting Systems
 - iii. Test & Evaluate Charging Systems
 - iv. Test & Evaluate Lighting Systems (headlights, brake & tail lights, turn signals)
 - v. Test & Evaluate Gauges
 - vi. Test & Evaluate Instrument Panel Warning Lights

- c. Electrical Systems Service & Repair
 - i. Perform soldering and build fused jumper wire & short tester
 - ii. R&R Starter motor and disassemble/assemble with bench testing
 - iii. R&R Alternator and disassemble/assemble with bench testing
 - iv. Disassemble and Inspect Instrument panel components (gauges, warning lights, etc.)
- 2. Service Literature
 - a. Use repair manuals & wiring diagrams to support diagnosis & repair
 - b. Use Technical Service Bulletins to supplement repair manuals & wiring diagrams

Suggested Reading Other Than Required Textbook

1. Medium and Heavy Duty Truck/Equipment periodicals 2. Other professional journals

Examples of Required Writing Assignments

Precis of recent industry related technology research using APA format.

Examples of Outside Assignments

1. Complete weekly ASE preparation exam homework questions at the end of each text chapter 2. Complete post lab critical thinking questions
Example: After reviewing the 12V/24V schematic and the repair manual trouble shooting guide for the Kenworth W900 truck starting system, what symptom(s) would be apparent if a 5V voltage drop is found through the cable leading from the control battery bank to the control system terminal of the 12V/24V starting switch? 3. Take the T6 ASE test

Instruction Type(s)

Lecture, Lab, Online Education Lecture