

ATL 161 Course Outline as of Fall 2024**CATALOG INFORMATION**

Dept and Nbr: ATL 161 Title: ELECTRICAL 1

Full Title: Mobile Electrical Systems 1

Last Reviewed: 1/22/2024

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.50	17.5	Lecture Scheduled	43.75
Minimum	3.00	Lab Scheduled	1.50	6	Lab Scheduled	26.25
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 87.50

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

Catalog Description:

Students will explore automotive electrical and electronic fundamentals including Ohm's Law, basic electrical circuits, components, battery, starting, charging, basic wiring systems, electrical components, the use of basic wiring diagrams for trouble shooting systems, repair of wiring circuits and correct use of diagnostic equipment. This course prepares students to take the Automotive Service Excellence (ASE) A6/T6 Electrical/Electronic Systems certification test along with ATL 162 Mobile Electrical Systems 2. This course conforms with ASE Education Foundation instructional guidelines.

Prerequisites/Corequisites:**Recommended Preparation:**

Eligibility for ENGL 1A or equivalent and MATH 25 or equivalent

Limits on Enrollment:**Schedule of Classes Information:**

Description: Students will explore automotive electrical and electronic fundamentals including Ohm's Law, basic electrical circuits, components, battery, starting, charging, basic wiring

systems, electrical components, the use of basic wiring diagrams for trouble shooting systems, repair of wiring circuits and correct use of diagnostic equipment. This course prepares students to take the Automotive Service Excellence (ASE) A6/T6 Electrical/Electronic Systems certification test along with ATL 162 Mobile Electrical Systems 2. This course conforms with ASE Education Foundation instructional guidelines. (Grade or P/NP)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 1A or equivalent and MATH 25 or equivalent

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	Area	Effective:	Inactive:
CSU GE:	Transfer Area	Effective:	Inactive:
IGETC:	Transfer Area	Effective:	Inactive:
CSU Transfer:		Effective:	Inactive:
UC Transfer:		Effective:	Inactive:

CID:

Certificate/Major Applicable:

Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

1. Demonstrate the proper use of a Digital Multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance.
2. Analyze and diagnose a mobile equipment charging system using appropriate electrical tools and equipment.
3. Analyze and diagnose a mobile equipment starting system using appropriate electrical tools and equipment.
4. Analyze and diagnose a mobile equipment low-voltage battery system using appropriate electrical tools and equipment.

Objectives:

At the conclusion of this course, the student should be able to:

1. Identify and interpret electrical/electronic system concern and determine necessary action.
2. Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law, Watts Theory).
3. Demonstrate the proper use of a digital multimeter (DMM), test lights, logic probes, and fused jumper wires during diagnosis of electrical circuit problems.
4. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw).
5. Inspect and test fusible links, circuit breakers, and fuses, repair wiring harnesses and connectors, and perform solder repair of electrical wiring.
6. Perform battery state-of-charge test, capacity test, and confirm proper battery capacity for

vehicle application.

7. Perform battery service, perform slow/fast battery charge, inspect and clean battery cables, connectors, clamps, and hold-downs, repair or replace as needed.
8. Start a vehicle using jumper cables and a battery or auxiliary power supply.
9. Perform starter current draw tests, generator (alternator) output tests, circuit voltage drop tests.
10. Inspect and test starter relays and solenoids.
11. Remove and install starters and alternators.
12. Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.

Topics and Scope:

Lecture-Related Topics & Scope:

- I. Fundamentals of Basic Electricity/Electronics
- II. Rules and Principles of Magnetism and How it Relates to Relays, Solenoids, Motors, and Alternators
- III. Battery Systems
- IV. Starter Systems
- V. Charging Systems
- VI. Diagnostic Equipment (Digital Multimeter, Battery Testers, and Ignition Analyzers)
- VII. Electrical/Electronic Troubleshooting
- VIII. Hazardous Material Handling
- IX. Parasitic on Mobile Equipment Battery Testing
- X. Shop Safety and Safety Practices
- XI. Complete DVOM Meter Certification

Laboratory-Related Topics & Scope:

- I. Demonstrate Proper Shop Safety and Working Practices, including
 - A. Tools
 - B. Equipment
 - C. Hazardous waste handling
- II. Perform Ohm's Law Calculations
- III. Perform Watts Theory Calculations
- IV. Identify Circuit Types
- V. Identify Electrical System Components
- VI. Perform Wire and Terminal Repairs
- VII. Perform Battery Tests Utilizing Appropriate Test Equipment
- VIII. Perform Charging System Tests Utilizing Appropriate Test Equipment
- IX. Perform Starting System Tests Utilizing Appropriate Test Equipment
- X. Demonstrate Multimeter Usage
- XI. Perform Voltage Drop Tests

Assignment:

Lecture-Related Assignments:

1. Weekly reading (30-70 pages)
2. Weekly quizzes
3. Midterm exam (1)
4. Final exam

Lab-Related Assignments:

1. Lab notebook

2. Weekly lab exercises and skill tests
3. Weekly lab reports

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab notebook	Writing 0 - 10%
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Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab reports	Problem solving 5 - 20%
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Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Lab exercises and skills test	Skill Demonstrations 30 - 50%
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Exams: All forms of formal testing, other than skill performance exams.

Weekly quizzes; midterm exam; final exam	Exams 30 - 50%
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Other: Includes any assessment tools that do not logically fit into the above categories.

None	Other Category 0 - 0%
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Representative Textbooks and Materials:

- Automotive Electrical and Engine Performance. 8th ed. Halderman, James. Prentice Hall. 2020
- Automotive Electricity and Electronics. 1st ed. Jones, David. CDX. 2018 (classic)
- Advanced Automotive Electricity and Electronics. Klyde, Michael. CDX. 2018 (classic)
- Instructor prepared materials