

I. CATALOG DESCRIPTION:

- A. Department Information:
Division: Technical
Department: Automotive
Course ID: AUTO 064
Course Title: Automotive Electrical: Battery, Starting & Charging Systems
Units: 4
Lecture: 3 Hours
Laboratory: 3 Hours
Prerequisite: None
- B. Catalog and Schedule Description:
Principles of automotive electricity and electronics systems covering batteries, charging, and starting systems. Detail topics include the use of a digital multi-meter for the analysis of series, parallel, and series-parallel circuits. This course along with AUTO 065 will prepare students for ASE A-6 certification test.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon successful completion of the course, the student will be able to:

- A. Identify safety requirements and recognize safety signs and symbols.
- B. Demonstrate a working knowledge of basic electrical concepts including but not limited to Ohm's Law, resistance, voltage, and current.
- C. Interpret basic units and principles of electricity and magnetism and their interrelationship and application.
- D. Diagnose and repair malfunctions in electrical components.
- E. Describe battery purpose, battery operation, and capacity.
- F. Identify and explain starting system principles.
- G. Explain charging system function and operation.

IV. COURSE CONTENT:

- A. Shop Safety
 - 1. Hazardous materials
 - 2. Material Safety Data Sheets
 - 3. Machinery hazards
- B. Basic Electricity, DC and AC Circuits
 - 1. Electrical fundamentals
 - 2. Conductors and insulators
 - 3. Characteristics of electricity (current, voltage, resistance)
 - 4. Introduction to digital multi-meter
 - 5. The complete electrical circuit
 - 6. Using DMM
 - 7. Ohm's law
 - 8. Series and Parallel Circuits
 - 9. Circuit Protection and Circuits Faults
- C. Electromagnetic Devices, Electrical/Magnetic Components
 - 1. Magnetism and Electromagnetism
 - 2. Electromagnetic Load Devices
 - 3. Magnetic (Electromagnetic) Induction
- D. General Electrical Diagnosis
 - 1. Reading Electrical Schematics and Wiring Diagrams
 - 2. Diagnostic Strategy

3. Test Equipment and Special Tools
4. Horn and Wiper Diagnosis and Repair
- E. Battery Diagnosis and Service
 1. Battery Operation
 2. Battery Service
 3. Battery Diagnosis
- F. Charging System Diagnosis and Service
 1. Charging System Operation
 2. Charging System Diagnosis
 3. Charging System Services
- G. Starting System
 1. Starting System Operation
 2. Starting System Diagnosis
 3. Starter Service
- H. Automotive Wiring and Wire Service
 1. Inspection of Wiring
 2. Soldering
- I. Lighting System Diagnosis
 1. Operation
 2. Lighting System Diagnosis

V. METHODS OF INSTRUCTION:

- A. Lecture
- B. Computer assisted instruction and shop manuals
- C. Class and group discussion
- D. Manufacturer's video instruction
- E. Daily lab demonstrations

VI. TYPICAL ASSIGNMENTS:

- A. Read assigned chapters and answer questions at the end of each chapter
Typical Question:
What five factors influence the resistance of conductors?
- B. Class discussion:
Typical Topic:
Difference between Electron Theory and Conventional Theory
- C. Videotapes
Typical Assignment:
Take notes, outline key point of discussion
- D. Lab assignments - Complete task sheets as per NATEF standards
Typical Assignments:
 1. Use wiring diagrams during diagnosis of electrical circuit problems.
 2. Remove and install starter.
 3. Perform battery state-of-charge test.

VII. EVALUATION(S):

- A. Methods of evaluation:
 1. Chapter review questions
 2. Quizzes (Multiple Choice, Essay and True /False)
 3. Mid-term examination (Multiple Choice)
 4. Final examination (Multiple Choice and Essay)Typical Questions:
 - a) What must occur before current can flow through a circuit?
 - b) If any component in the series circuit fails and interrupts current flows, what is the result?
 - c) Three lamps are connected in parallel. What would happen if one lamp burns out?

5. Assigned lab task as per NATEF standards (A-6 Sections A, B, C, D, E)
NATEF A – 6 Electrical/Electronic System
 - Section A: General Electrical System Diagnosis Task 1-12
Typical Task:
Check electrical circuit with test light: determine necessary action.
 - Section B: Battery Diagnosis and Service Task 1-7
Typical Task:
Perform battery capacity test: determine needed service.
 - Section C: Starting System Diagnosis and Repair Task 1-7
Typical Task:
Remove and install starter.
 - Section D: Charging System Diagnosis and Repair Task 1-7
Typical Task:
Diagnosis charging system for the cause of undercharge, no-charge, and overcharge conditions.
 - Section E: Lighting Systems Diagnosis and Repair Task 1-3
Typical Task:
Inspect, replace, and aim headlights and bulbs.

B. Frequency of evaluation:

1. One mid-term examination
2. One final examination
3. Weekly quizzes
4. Bi-weekly text book chapter review questions
5. Daily NATEF task assignments (Lab)

VIII. TYPICAL TEXT(S):

Chek-Chart Publications, Automotive Electrical & Electronic System, 4th Edition, Columbus, Ohio: Prentice Hall, 2000

Barry Hollembeak, Automotive Electricity & Electronics, 2nd Edition, Rochester Hills, Michigan: Delmar Publishers, 2000

James E. Duffy, Auto Electricity and Electronics Technology, Tinley Park, Illinois: Goodheart-Willcox Company, 1999

William H. Crouse, Automotive Electronics and Electrical Equipment, 10th Edition, New York, New York: McGraw-Hill Book Company, 1998

Instructional Materials Laboratory, Automotive Technology Curriculum, 2001 Edition CD-ROM, Columbia, Missouri, 2001

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Safety equipment and adequate clothing