

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** ELECTRICAL, ELECTRONICS & FUEL SYSTEMS I  
**CODE NO. :** ASM114 **SEMESTER:** 2  
**PROGRAM:** MOTIVE POWER TECHNICIAN - SERVICE &  
MANAGEMENT  
**AUTHOR:** PETER NELSON  
**DATE:** DEC. 05 **PREVIOUS OUTLINE DATED:** FEB. 05

**APPROVED:**

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**DEAN** **DATE**

**TOTAL CREDITS:** 6

**PREREQUISITE(S):** ASM101 BASIC AUTOMOTIVE SKILLS

**LENGTH OF COURSE:** TAUGHT IN BLOCK FORMAT

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*For additional information, please contact C. Kirkwood, Dean  
School of Technology, Skilled Trades & Natural Resources*

**I. COURSE DESCRIPTION:**

In this course the student will learn the construction, operating principles, testing and service techniques used in electrical, electronic and fuel systems including motors, solenoids, relays, coils, diodes, transistors, A/C generators, lead acid batteries, schematics, fuel pumps, tanks & lines. Emission control systems will be studied focusing on the sources of the pollutants and their affects on our environment. They will also be introduced to electronic fuel injection, carburetion, propane, natural gas and diesel fuel systems.

## II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Discuss the sources of electricity and outline the construction, operating principles, testing and servicing of electrical system circuits and components.

### Potential Elements of the Performance:

- List four sources of electricity.
- Define the following electrical terms: opens, shorts, grounds and high resistance connections.
- Explain the construction and uses of transistors, resistors, diodes and switches.
- Outline the operating principles of electric motors, relays, solenoids and ignition coils.
- Demonstrate the use of digital meters on electrical circuits and components to determine current draw, resistance, voltage drop, opens, shorts, grounds and diode operation.
- Draw and interpret electrical schematics and symbols.
- Perform on vehicle verification of wiring diagram circuits.
- Describe manufacturers maintenance procedures to repair electrical circuit wiring.

2. Describe the construction, operating principles, testing and servicing of lead acid batteries.

### Potential Elements of the Performance:

- Explain the construction of automotive lead acid batteries.
- Compare maintenance free batteries to low maintenance batteries.
- Demonstrate cleaning and testing of batteries.
- Connect multiple batteries to a slow charger.

3. Apply the operating principles, testing and servicing of today's gasoline fuel systems.  
Potential Elements of the Performance:
  - Explain the properties of combustible fuels used in the modern automobile.
  - Interpret an introduction to electronic fuel injection, carburetion and alternate fuels.
  - Perform visual inspections of tanks, lines and filters.
  - Demonstrate fuel pump pressure, capacity and vacuum tests.
  - Adjust carburetor idle speed, choke and idle mixture to confirm to manufacture's specifications.
  
4. Outline the basic operating principles, construction and testing of diesel fuel injection systems.  
Potential Elements of the Performance:
  - Explain the construction and operation of diesel system mechanical injectors, fuel delivery pumps and glow plugs.
  - Test injectors for spray pattern and opening pressures.
  - Describe the compression ignition process.
  - Compare and contrast diesel fuel vs. gasoline.
  
5. Discuss the importance of today's complex intake and exhaust systems with regards to smaller more efficient engines.  
Potential Elements of the Performance:
  - Define volumetric efficiency and scavenging.
  - Prepare a project outlining different air filter systems.
  - Compare and contrast the use of turbochargers vs. superchargers.
  - Explain intake manifold port tuning.
  
6. Explain the affects of automobile pollutants on the environment and analyze the emission systems used to control them.  
Potential Elements of the Performance:
  - List and describe all emission control systems and their components.
  - Outline and analyze harmful chemicals leaving the tailpipe .
  - Explain the legal requirements of exhaust emissions.
  - Test the operation of EGR systems, PCV systems and catalytic converters.
  - Outline carbon canister filter replacement.

**III. TOPICS:**

1. Electrical Fundamentals
2. Lead Acid Batteries
3. Gasoline Fuel Systems
4. Diesel Fuel Injection Systems
5. Intake and Exhaust Systems
6. Emissions Control Systems

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Automotive Technology – Text & Workbook  
 Pen, pencils, calculator, and 3-ring binder

Shop coat or coveralls  
 CSA approved steel toe boots (high top)  
 CSA approved safety glasses  
 (these items mandatory for shop)

**V. EVALUATION PROCESS/GRADING SYSTEM:**

**The final grade for this course will be based on the results of classroom, assignments and shop evaluations weighed as indicated:**  
**Classroom – 60% of the final grade is comprised of term tests**  
**Assignments – 10% of the final grade is comprised of a number of technical reports**  
**Shop – 30% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude**  
**(Student will be given notice of test and assignment dates in advance)**

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	

  

CR(credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical

U	placement or non-graded subject areas. Unsatisfactory achievement in field/clinical placement or non-graded subject areas.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

## VI. SPECIAL NOTES:

### Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 703 so that support services can be arranged for you.

### Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

### Plagiarism:

Students should refer to the definition of "academic dishonesty" in *Student Rights and Responsibilities*. Students who engage in "academic dishonesty" will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

### Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.