

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**COURSE OUTLINE**

**COURSE TITLE:** Electrical / Electronics

**CODE NO. :** MPT201                      **SEMESTER:** THREE

**PROGRAM:** Motive Power Technician - Advanced Repair  
(4044)

**AUTHOR:** Derrick Smith

**DATE:** October            **PREVIOUS OUTLINE**            NA  
2010                      **DATED:**

**APPROVED:**

*“Corey Meunier”*  
**CHAIR**                                      Date

**TOTAL CREDITS:** THREE

**PREREQUISITE(S):** MPF103 & MPF123

**HOURS/WEEK:**

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**For additional information, please contact Corey Meunier, Chair**  
**School of Technology & Skilled Trades**  
**(705) 759-2554, Ext. 2610**

I. **COURSE DESCRIPTION:**

In this course, you will be introduced to electronic components used in the motive power industry. Wiring schematic interpretation and industry standard diagnostic procedures will be studied and applied to vehicle subsystems such as computer controlled charging systems, starting systems, power accessories and lighting systems.

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

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

### 1. *Describe the construction, operation, composition, types, style and applications of electronic and circuit devices.*

Potential Elements of the Performance:

#### **Diodes**

- forward and reverse bias
- current control

#### **Transistors**

- forward and reverse bias
- PNP and NPN
- switching
- amplification

#### **Capacitors**

#### **Sensors**

##### Voltage generating

- pulse generators
- piezoelectric
- galvanic
- Hall effect
- optical
- thermistors

##### Variable resistor

- rheostat
- potentiometers
- piezoresistive

#### **Circuit Devices**

- solenoids
- relays

### 2. *Perform inspection and testing procedures for electronic and*

***circuit devices following manufacturers' recommendations.*****Potential Elements of the Performance:****Diodes**

- test the operation of a diode with a DVOM

**Transistors**

- test the operation of a switching diode in a power train control module

**Capacitors**

- measure capacitance

**Sensors**

- measure voltage output and resistance of magnetic pulse generators
- measure voltage output of piezoelectric sensors
- measure voltage output of galvanic sensors
- perform resistance tests on potentiometers and thermistors
- capture oscilloscope wave form patterns for hall effect, galvanic, magnetic pulse generator and piezoelectric sensors

**Circuit Devices**

- perform electrical diagnosis on solenoids and relays

**3. *Describe the construction, operation, composition, types, styles and application of original equipment manufacturers' (OEM) power accessories and electrical options.*****Potential Elements of the Performance:**

- instrumentation
- power accessories
- lighting
- communication and entertainment systems
- blower motors and controls

**4. *Perform inspection testing and diagnostic procedures on original equipment manufacturers' (OEM) power accessories and electrical options following manufacturers' recommendations.*****Potential Elements of the Performance:**

- diagnose faults, i.e., shorts, opens, grounds, high resistance
- circuit analysis following manufacturers' troubleshooting charts
- interpret various types of manufacturers' wiring diagrams

**5. *Describe the construction, operation, types, styles and***

***application of computer-controlled starting systems, charging systems and electronic regulators.***

Potential Elements of the Performance:

- computer-controlled starting and charging system
- alternator field
- ambient temperature sensing
- battery voltage sensing
- battery temperature sensing
- zener diode and voltage control transistors
- field current switching
- Ignition switch input
- Starter control relay
- BCM controlled starter inputs and outputs

**6. *Perform inspection, testing and diagnostic procedures on starting and computer-controlled charging systems following manufacturers' recommendations.***

Potential Elements of the Performance:

- outline the recommended testing sequence to determine the overall condition of the charging and starting systems
- perform visual charging and starting system tests
- identify and isolate faulty charging and starting system components by utilizing the recommended troubleshooting procedures and test equipment

**III. TOPICS:**

1. Basic Electronics and Circuit Devices
2. Inspection and Testing of Basic Electronics and Circuit Devices
3. Power Accessories and Electrical Options
4. Power Accessories System Diagnosis
5. Computer-controlled starting systems, charging systems and electronic regulators.
6. Perform inspection, testing and diagnostic procedures on starting and computer-controlled charging systems.

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

**Title:** Heavy Duty Truck Systems

**Edition:** 4th ed., 12959#

**Author:** Bennett

**Publisher:** Thomson Nelson Learning Canada

**Title:** Automotive Technology: A Systems Approach/AST Test Prep

**Edition:** 06 ed., 17810#

**Author:** Erjavec

**Publisher:** Thomson Nelson Learning Canada

Pens, pencils, calculator, 3-ring binder

The following items are mandatory in the shop:

- shop coat or coveralls
- CSA approved steel toe boots (high top)
- CSA approved safety glasses

**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.

(Students 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%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
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:

### **Attendance:**

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

***It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.***

**Cell phones are not allowed  
to be on in the classrooms or shop areas  
during class time.**

## VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.