



**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 introduced and applied to vehicle subsystems such as computer controlled charging systems and starting systems.

Students will be required to follow proper safety procedures when performing the above tasks according to both Sault College Motive Power Department Standards and Vehicle Manufacturers safety regulations and specifications.

**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:

**Describe the construction, operation and applications of:**

**Diodes**

- forward and reverse bias
- current control

**Transistors**

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

**Capacitors**

- ceramic and electrolytic

**Sensors**Voltage generating

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

Variable resistor

- rheostat
- potentiometers
- piezoresistive

**Circuit Devices**

- solenoids
- relays

**2. Perform inspection, testing and diagnostic 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**

- verify 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

**Circuit Devices**

- perform electrical diagnosis on solenoids and relays

**3. Perform inspection testing and diagnostic procedures using manufactures wiring schematics**

Potential Elements of the Performance:

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

**4. 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

**5. 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. Schematic interpreting
4. Computer-controlled starting systems and charging system operation
5. Computer-controlled starting systems and charging system diagnosis

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

**Title:** Heavy Duty Truck Systems

**Edition:** 5<sup>th</sup> ed.

**Author:** Bennett

**Publisher:** Thomson Nelson Learning Canada

**Title:** Automotive Technology: A Systems Approach

**Edition:** 2<sup>nd</sup> Canadian Ed.

**Author:** Erjavec

**Publisher:** Thomson Nelson Learning Canada

Pens, pencils, calculator, 3-ring binder

The following items are mandatory in the shop:

- 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 – 35% of the final grade is comprised of term tests
- Assignments – 10% of the final grade is comprised of a number of technical reports
- Shop – 45% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude
- Employability Skills – 10% of final grade is comprised of attendance, class participation, show ability to follow direction and being a team player.

(Student will be given notice of test and assignment dates in advance)

**NOTE: All assignments will be in typed format. NO hand written assignments will be accepted.**

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 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.	

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

**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.***

**Eye, Face and Foot Personal Protection Equipment (P.P.E):**

Students are required to wear appropriate Personal Protection Equipment (P.P.E) in designated areas at all times. The designated areas for eye and foot protection in the Motive Power areas are: C1073 (Automotive), C1000, C1010, and C1040 (Truck/Coach and Heavy Equipment) and C1120 (Marine and Small Engines). Appropriate P.P.E must also be worn when facing hazards outside of these designated areas.

**Minimum Eye Protection:**

All protective eye wear shall meet the requirements of:

C.S.A. - Z94.3 or A.N.S.I. - Z87.1 +.

Approved safety glasses (lens and frames) shall have side protection such as wrap around design or fixed side shields.

**Minimum Foot Protection:**

1. Boot height- minimum 5 ½" uppers, measured from the top of the sole.
2. CSA Green Patch rating.

**VII. COURSE OUTLINE ADDENDUM:**

The provisions contained in the addendum located in D2L and on the portal form part of this course outline.