



## I. COURSE DESCRIPTION:

In this course you will gain an understanding of automotive and heavy duty electrical circuits, wiring diagrams, electro-magnetism and the use of applied test equipment. Construction and operating principals of starters and alternators will be discussed. You will perform basic starting and charging system testing. Electronic ignition system operation and design will be studied including manufacture's maintenance and diagnostic procedures.

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

Upon successful completion of this course, the CICE student, with the assistance of a Learning Specialist will demonstrate the basic ability to:

### 1. ***Outline the basic fundamentals of wiring diagrams with the assistance of a Learning Specialist.***

#### Potential Elements of the Performance:

- Prepare a valley forge style diagram for a relay controlled circuit
- Follow the path of current flow in a circuit using a wiring schematic
- Relate troubleshooting procedures for opens, shorts and high resistance faults to a wiring schematic

### 2. ***Connect and operate diagnostic test equipment***

#### Potential Elements of the Performance:

- Use a test lamp to diagnose an open in a circuit
- Use a DVOM to diagnose an open in a circuit
- Locate unwanted resistance in a circuit using voltage drop testing
- Measure resistance in a circuit using a DVOM
- Measure parasitic drain
- Measure current flow using an inductive ammeter
- Remove and replace electrical components

### 3. ***Describe the basic principals of operation and construction of starting and charging systems.***

#### Potential Elements of the Performance:

- Describe the construction and operation of an alternator
- Describe the construction and operation of a starter motor
- Explain the motor principle

- Describe electromagnetic induction

**4. *Test starting and charging system operation with the assistance of a Learning Specialist.***

Potential Elements of the Performance:

- Perform charging system tests following manufactures recommended procedures
- Perform starting system tests following manufactures recommended procedures

**5. *Explain the basic construction, operation and maintenance of ignition systems.***

Potential Elements of the Performance:

- Identify ignition system components
- Describe the fundamental operation of a spark ignition system
- Perform visual inspection of ignition system components
- Perform a spark test
- Measure secondary voltage using a KV meter

**III. TOPICS:**

1. APPLIED ELECTRICAL SCHEMATICS
2. DIAGNOSTIC TESTING PROCEDURES AND COMPONENT REPLACEMENT
3. CHARGING AND STARTING SYSTEM OPERATION
4. CHARGING AND STARTING SYSTEM TESTING
5. IGNITION SYSTEMS

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

Heavy Duty Truck Systems, 4<sup>th</sup> edition.  
Automotive Technology, Canadian edition.

## V. EVALUATION PROCESS/GRADING SYSTEM:

Tests 50%  
 Assignments 10%  
 Labs (Shop) 40%

A shop grade is comprised of attendance, punctuality, preparedness, completion of assigned tasks, work organization and employability skills.

If a student misses a test he/she must have a valid reason (i.e. medical or family emergency – documentation may be required). In addition, the instructor **must** be notified **prior** to the test sitting. If this procedure is not followed the student will receive a mark of zero on the test with no make-up option. Test “rewrites” will not be offered.

The following semester grades will be assigned to students:

<b>Grade</b>	<b>Definition</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.	

**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 on the portal form part of this course outline.

**CICE Modifications:****Preparation and Participation**

1. A Learning Specialist will attend class with the student(s) to assist with inclusion in the class and to take notes.
2. Students will receive support in and outside of the classroom (i.e. tutoring, assistance with homework and assignments, preparation for exams, tests and quizzes.)
3. Study notes will be geared to test content and style which will match with modified learning outcomes.
4. Although the Learning Specialist may not attend all classes with the student(s), support will always be available. When the Learning Specialist does attend classes he/she will remain as inconspicuous as possible.

**A. Tests may be modified in the following ways:**

1. Tests, which require essay answers, may be modified to short answers.
2. Short answer questions may be changed to multiple choice or the question may be simplified so the answer will reflect a basic understanding.
3. Tests, which use fill in the blank format, may be modified to include a few choices for each question, or a list of choices for all questions. This will allow the student to match or use visual clues.
4. Tests in the T/F or multiple choice format may be modified by rewording or clarifying statements into layman's or simplified terms. Multiple choice questions may have a reduced number of choices.

**B. Tests will be written in CICE office with assistance from a Learning Specialist.*****The Learning Specialist may:***

1. Read the test question to the student.
2. Paraphrase the test question without revealing any key words or definitions.
3. Transcribe the student's verbal answer.
4. Test length may be reduced and time allowed to complete test may be increased.

**C. Assignments may be modified in the following ways:**

1. Assignments may be modified by reducing the amount of information required while maintaining general concepts.
2. Some assignments may be eliminated depending on the number of assignments required in the particular course.

***The Learning Specialist may:***

1. Use a question/answer format instead of essay/research format
2. Propose a reduction in the number of references required for an assignment
3. Assist with groups to ensure that student comprehends his/her role within the group
4. Require an extension on due dates due to the fact that some students may require additional time to process information
5. Formally summarize articles and assigned readings to isolate main points for the student
6. Use questioning techniques and paraphrasing to assist in student comprehension of an assignment

**D. Evaluation:**

Is reflective of modified learning outcomes.