## SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

## SAULT STE. MARIE, ONTARIO

# COURSE OUTLINE

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| **COURSE TITLE:** | ELECTRICAL II | | |
| **CODE NO. :** | MPF123 | **SEMESTER:** | TWO |
| **PROGRAM:** | Motive Power Technician – Advanced Repair<br>Motive Power Fundamentals – Automotive Repair<br>Motive Power Fundamentals<br>– Heavy Equipment & Truck Repair | | |
| **AUTHOR:** | Dan Tregonning | | |
| **DATE:** | January 2013 | **PREVIOUS OUTLINE DATED:** | March 2012 |

**APPROVED:**

*"Corey Meunier"*

**CHAIR** **DATE**

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| **TOTAL CREDITS:** | 3 |
| **PREREQUISITE(S):** | MPF114 |
| **HOURS/WEEK:** | 5 |



***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 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 student will demonstrate the ability to:

***1. Outline the fundamentals of wiring diagrams***

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 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.***

Potential Elements of the Performance:

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

***5. Explain the 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, 4th edition.
Automotive Technology, Canadian edition.

## 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 – 40% of the final grade is comprised of term tests.
- Assignments – 10% of the final grade is comprised of a number of technical reports or assignments.
- Shop – 50% 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:

| Grade | Definition | *Grade Point Equivalent* |
|---|---|---|
| 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 |

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| 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.