

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: ELECTRICAL/ELECTRONICS AND EMISSIONS SYSTEMS

CODE NO. : AST703 **SEMESTER:** ONE

PROGRAM: AUTOMOTIVE SERVICE TECHNICIAN – LEVEL II

AUTHOR: JAMIE SCHMIDT

DATE: SEPT 2010 **PREVIOUS OUTLINE DATED:** MAY 2010

APPROVED: _____
“Corey Meunier”
CHAIR DATE

TOTAL CREDITS: TWELVE

PREREQUISITE(S):

HOURS/WEEK:

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I. COURSE DESCRIPTION:

- Students completing this course will perform assigned operations with meters for voltage, amperage and resistance tests and connect and operate diagnostic test equipment according to manufacturers' operating procedures.
- Starting and charging systems will be covered and the successful student will demonstrate the ability to describe the construction and operation of current systems as well as perform troubleshooting procedures according to manufactures specifications.
- Students will learn the fundamentals of electronics in the automotive industry and perform diagnostics procedures.
- Electronic ignition systems will be covered and the successful student will demonstrate the ability to describe the construction and operation of current systems as well as perform troubleshooting procedures according to manufactures specifications.
- Gasoline fuel injection systems will be studied focusing on the principles of operation and basic testing.
- Emission control systems will be studied focusing on the principles of operation and basic testing.
- The curriculum for AST Level 2 apprenticeship training and has been approved by the Ministry of Training, Colleges and Universities.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. ***Demonstrate a working knowledge of performing circuit calculations to verify Ohm's, Watts and Kirchhoff's Laws with a selection of meters.***

Potential Elements of the Performance:

- Define the essential introductory information and fundamentals of electrical circuits as they apply to various circuits
- Perform circuit calculations to verify Ohm's, Watts's and Kirchhoff's Laws.
- Perform assigned operations with meters for voltage, amperage and resistance tests.

2. Demonstrate a working knowledge of the purpose, construction and principles of operation for diagnostic test equipment.

Potential Elements of the Performance:

- Define the purpose and fundamentals of diagnostic test equipment.
- Describe the construction, types, styles and application of diagnostic test equipment.
- Explain the operating principles of diagnostic test electronic equipment.
- Connect and operate diagnostic test equipment according to manufacturers operating procedures.

3. Demonstrate a working knowledge of purpose, construction and operating principles of cranking systems and perform testing and diagnostic procedures.

Potential Elements of the Performance:

- Define the purpose and fundamentals of cranking systems.
- Describe the construction, types, styles and application of cranking motor circuits and drives.
- Explain the principles of operation of cranking motor circuits and drives.
- Define the introductory information and fundamentals of factors affecting cranking system operation.
- Perform inspection, testing, and diagnostic procedures on cranking motor circuits and drives following manufacturers' recommendations.

4. Demonstrate a working knowledge of the construction, principles of operation, inspection and testing of electronic devices.

Potential Elements of the Performance:

- Describe the construction, composition, types, style and applications of electronic devices.
- Explain the principles of operation of electronic devices.
- Perform inspection and testing procedures for electronic devices following manufacturers' recommendations.

5. Demonstrate a working knowledge of the purpose, construction, principles of operation, inspecting and testing for ignition fundamentals.

Potential Elements of the Performance:

- Define the purpose and fundamentals of electronic ignition systems and controls.
- Describe the construction, types, styles and application of electronic ignition systems devices.
- Explain the principles of operation of electronic ignition systems devices.
- Perform inspection and testing procedures on electronic ignition systems devices following manufacturers' recommendations.
- Perform assigned operations for the following as to manufacturers' recommendations.

6. Demonstrate a working knowledge of the purpose, construction, principles of operation, inspecting and testing for charging systems and control units.

Potential Elements of the Performance:

- Define the purpose and fundamentals of charging systems and control circuits.
- Describe the construction, types and application of charging systems and controls.
- Explain the principles of operation of A/C generators and voltage regulators.
- Perform inspection, testing, and diagnostic procedures A/C generators and voltage regulators following manufacturers' recommendations
- Perform assigned operations for the following as to manufacturers' recommendations.

7. Demonstrate a working knowledge of the purpose, construction, principles of operation, inspecting and testing for electronic-controlled fuel injection systems.

Potential Elements of the Performance:

- Define the purpose and fundamentals of gasoline electronic-controlled fuel injection systems.
- Describe the construction, types, styles and application of gasoline fuel injection systems.
- Explain the basic principles of operation of electronic fuel

injection.

- Perform inspection and testing procedures on electronic fuel injection systems following manufacturers' recommendations.
- Perform assigned operations for the following as to manufacturers' recommendations.

8. Demonstrate a working knowledge of the principles of operation and inspecting and testing for emission control systems.

Potential Elements of the Performance:

- Explain the principles of operation of emission control systems.
- Perform inspection and testing procedures on emission control systems following manufacturers' recommendations.

III. TOPICS:

1. Electrical Circuit Calculations
2. Diagnostic Test Equipment
3. Cranking Systems and Control Circuits
4. Electronic Fundamentals
5. Electronic Ignition Fundamentals
6. Charging Systems and Control Circuits
7. Gasoline Fuel Injection Fundamentals
8. Emission Control Systems

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Automotive Technology by Erjavic

V. EVALUATION PROCESS/GRADING SYSTEM:

Theory Testing	60%
Practical Application Exercises	30%
Notebook and Organizational Skills	10%

The following semester grades will be assigned to students:

Grade	<u>Definition</u>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	3.00
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.

VII. COURSE OUTLINE ADDENDUM:

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

Eye, Face and Foot Personal Protection Equipment (PPE)

Students are required to wear appropriate Personal Protection Equipment (PPE) 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 PPE must also be worn when facing hazards outside of these designated areas.

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.

The minimum acceptable eye protection is a spectacle (class 1A on chart Z94.3). Dark tinted spectacles will not be accepted for general indoor use. Additional eye and face protection is required for specific hazards. Chart Z94.3 outlines the appropriate PPE for specific hazards.

Foot Protection:

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

Safety boots must be properly laced and not be worn or damaged as to impair their effectiveness.