

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 **LEVEL:** 2

PROGRAM: Automotive Service Technician Apprenticeship
(6068)

AUTHOR: Jamie Schmidt

DATE: June 2008 **PREVIOUS OUTLINE DATED:**

APPROVED:

**“Corey Meunier”
CHAIR**

DATE

TOTAL CREDITS: 12

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 Point

Grade	<u>Definition</u>	<i>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:

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. Students who engage in academic dishonesty will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. ADVANCE CREDIT TRANSFER:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question.