

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: ELECTRICAL, ELECTRONICS AND FUEL SYSTEMS III

CODE NO. : ASM 211 **SEMESTER:** 4

PROGRAM: MOTIVE POWER TECHNICIAN – SERVICE & MANAGEMENT

AUTHOR: Stephen Kent

DATE: January 06 **PREVIOUS OUTLINE DATED:** December 04

APPROVED:

DEAN

DATE

TOTAL CREDITS: 6

PREREQUISITE(S): ASM 202

HOURS/WEEK: TAUGHT BLOCK SEE INSTRUCTOR

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*For additional information, please contact C. Kirkwood, Dean
School of Technology, Skilled Trades, Natural Resources & Business
(705) 759-2554, Ext. 2688*

- I. **COURSE DESCRIPTION:** This course was designed to give the student a working knowledge in the diagnosis and repairs of wiring circuits, air bag systems, charging and starting systems, ignition systems, electronic fuel injection and emission control systems. The students will perform on vehicle diagnosis and repair using proper tools, high tech equipment and appropriate service information.

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

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

1. Trace power flows through wiring diagrams and trouble shoot electrical problems on assigned vehicles.
Potential Elements of the Performance:
 - Identify wiring schematic symbols.
 - Explain current flow and circuit operation of assigned vehicle electrical systems.
2. Explain the operation of a typical supplemental inflatable restraint (air bag) system.
Potential Elements of the Performance:
 - Identify air bag system components.
 - Outline the air bag deployment sequence.
 - State safety precautions when working on vehicles equipped with air bag systems.
3. Diagnose and repair starting and charging systems.
Potential Elements of the Performance:
 - Describe charging system operation.
 - Perform on vehicle voltage and amperage tests to verify system operation and compare to manufacturers specifications.
 - Disassemble an alternator and test internal components.
 - State the electric motor principle.
 - Identify different types of starter drives.
 - Perform on vehicle starting system analysis using modern electronic test equipment.
 - Replace a starter drive and inspect ring gear.

4. Explain ignition system operation.
Potential Elements of the Performance:
 - Compare and contrast conventional, electronic and distributorless ignition systems.
 - Explain ignition coil operation.
 - Identify different types of trigger devices. Eg. (hall effect, magnetic pulse and photo optical.)
 - Perform no spark diagnosis following manufacturers recommendations.
 - Check and adjust ignition timing when applicable.
 - Remove and install a distributor.
 - Analyze ignition performance using an electronic ignition system analyzer.
5. Describe different types of electronic fuel injection systems.
Potential Elements of the Performance:
 - Compare and contrast central and multiport fuel injection systems.
 - Identify fuel injectors, pumps and regulators.
 - Describe fuel injection component locations on the vehicle.
6. Perform fuel injection system maintenance and diagnosis.
Potential Elements of the Performance:
 - Clean fuel injectors using the Snap-on Moto vac fuel system cleaning equipment.
 - Clean throttle body assemblies following manufacturers recommendations.
 - Test fuel pressure and compare to manufacturers specifications.
 - Perform an injector balance test.
 - Scan on board diagnostic system to verify fuel trim and proper sensor operation.
 - Replace a fuel filter.
7. Describe emission control systems used on modern vehicles.
Potential Elements of the Performance:
 - Explain evaporative control system operation.
 - Describe the function of a catalytic converter.
 - Outline sources of vehicle pollution and their effects on the environment.
 - Identify types of EGR valves.
 - Explain how a scan tool can be used to verify emission system operation.

8. Test emission control systems for proper operation.

Potential Elements of the Performance:

- Perform ASM tests on ESP chassis dyno.
- Measure emissions on assigned vehicles using a 5 gas analyzer.
- Diagnose emission component failure from analyzer results.
- Test evaporative control systems following manufacturers recommendations.

III. TOPICS:

1. Trace power flows through wiring diagrams and trouble shoot electrical problems on assigned vehicles.
2. Explain the operation of a typical supplemental inflatable restraint (air bag) system.
3. Diagnose and repair starting and charging systems.
4. Explain ignition system operation.
5. Describe different types of electronic fuel injection systems.
6. Perform fuel injection system maintenance and diagnosis.
7. Describe emission control systems used on modern vehicles.
8. Test emission control systems for proper operation.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Modern Automotive Technology – Text & Workbook

Pens, pencils, calculator, 3-ring binder

*shop coat or coveralls

*CSA approved steel toe boots (high top)

*CSA approved safety glasses

*these items mandatory for shop

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 – 60% of the final grade is comprised of term tests

Assignments – 10% of the final grade is comprised of a number of technical reports

Shop – 30% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude

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

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% | 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 703 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.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. 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.

<include any other special notes appropriate to your course>

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.