

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



CICE COURSE OUTLINE

COURSE TITLE:	Fuel Systems I		
CODE NO. :	MPF124	SEMESTER:	Winter
MODIFIED CODE:	MPF0124		
PROGRAM:	Motive Power Technician – Advanced Repair Motive Power Fundamentals – Automotive Repair Motive Power Fundamentals – Heavy Equipment & Truck Repair		
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MODIFIED BY:	Shirley Timmermans, Learning Specialist CICE Program		
DATE:	Jan/2016	PREVIOUS OUTLINE DATED:	2015
APPROVED:		“Angelique Lemay”	Mar/2016
	_____		_____
	DEAN		DATE
TOTAL CREDITS:	Five		
PREREQUISITE(S):	MPF0103		
HOURS/WEEK:	Seven		

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I. COURSE DESCRIPTION

In this course, the CICE student, with assistance from a Learning Specialist, will develop a basic level of knowledge related to the construction, operating principles, testing and service techniques used in fuel systems including, fuel pumps, tanks, lines and sub-systems. Emission controls will be studied focusing on systems purpose and construction. The CICE student will also be introduced to electronic gasoline fuel injection and diesel fuel injection systems and electronic diesel fuel injection systems.

Students will be required to follow proper safety procedures when performing the above tasks according to both Sault College Motive Power Department Standards and Vehicle Manufacturers safety regulations and specifications.

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 a basic ability to:

1. *Describe function composition and properties of fuels.***Potential Elements of the Performance:****Gasoline fuel**

- volatility
- octane rating
- additives
- hydrocarbons
- atomization heat energy / BTU's
- Check alcohol content

Diesel fuel

- volatility
- cetane number
- viscosity
- additives
- Sulfur content, etc.

Alternate fuels

- LPG
- LNG
- E85
- Ethanol
- Bio diesel
- CNG

2. Explain the combustion principles of fuels.

Potential Elements of the Performance:

Describe:

- oxidation reactions
- products of combustion
- HC
- CO
- CO₂
- NO_x
- Particulates
- Measure exhaust emissions, gas and diesel
- thermal expansion and contraction
- air fuel ratios
- atomization / vaporization
- detonation
- pre-ignition

3. Define the purpose construction and operation of internal and external delivery components.

Potential Elements of the Performance:

- Describe fuel delivery components
- Identify all components attached to the fuel tank

4. Identify inspect and test fuel delivery sub system and emission components

Potential Elements of the Performance:

- Replace primary and secondary fuel filters on a diesel engine.
- Describe why we use different types of fuel filters and causes of defective filters
- Remove a fuel tank from a vehicle replacing a fuel pump.
- Fabricate, repair and replace fuel lines
- Test a fuel tank sending unit and the dash gauge manually and with a scan tool
- Perform fuel pressure testing on gasoline and diesel fuel injected engines.
- Operate fuel pump with scan tool
- Identify evaporative emission components

5. Intake and exhaust

Potential Elements of the Performance:

Explain the purpose and fundamentals, inspect and test intake and exhaust systems:

- volumetric efficiency

- scavenging
- manifold vacuum, boost and exhaust back pressure
- Boyle's Law, Charles Law, and Bernoulli's Theorem
- Identify and inspect exhaust system components including the catalytic convertors
- Identify SCR and DPF components
- Identify EGR system components
- Identify secondary air components

6. *Fuel injection introduction*

Potential Elements of the Performance:

- Identify fuel injection system types and the components of gas and diesel engines.
- Identify primary fuel metering sensing devices
- Access an OBDII Fuel related trouble code using scan tools as related to fuel system diagnosis.
- Access fuel system data with applicable scan tools and lap tops.

III. TOPICS:

1. Fuels
2. Combustion and emissions
3. Fuel delivery subsystems
4. Identify inspect and test fuel delivery sub system components
5. Intake and exhaust systems
6. Introduction to fuel injection and scan equipment

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Title: Heavy Duty Truck Systems

Edition: 6th ed.,

Author: Bennett

Publisher: Thomson Nelson Learning Canada

Title: Automotive Technology: A Systems Approach

Edition: 3rd Canadian Ed.

Author: Erjavec

Publisher: Thomson Nelson Learning Canada

Pens, pencils, calculator, 3-ring binder

The following items are mandatory in the Shop:

- CSA approved steel toe boots (high top)
- CSA approved safety glasses
- Approved coveralls

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 – 35% of the final grade is comprised of term tests
- Assignments – 10% of the final grade is comprised of a number of technical reports
- Shop – 45% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude
- Employability Skills – 10% of final grade is comprised of attendance, class participation, show ability to follow direction and being a team player.

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

NOTE: All assignments will be in typed format. NO hand written assignments will be accepted.

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:

Cell phones cannot be used in the class or in the Shop as they are not only a distraction but a potential hazard.

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.

Addendum:

Further modifications may be required as needed as the semester progresses based on individual student(s) abilities and must be discussed with and agreed upon by the instructor.

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.