

I. COURSE DESCRIPTION:

In this course, the CICE student will be exposed to common machine shop and reconditioning operations for engine crankshafts, connecting rods, cylinder block and cylinder heads. CICE students will have a sound understanding of basic engine lubrication and cooling system diagnosis. Emphasis will be placed on acquiring practical skills for internal and external engine repair procedures such as: engine timing component replacement, valve train service, cylinder head and gasket repairs, cooling and lubrication system repair and engine accessory component diagnosis.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the CICE student, along with the assistance of a Learning Specialist, will demonstrate the basic ability to:

1. *Discuss the purpose and fundamentals of camshaft and valve train assemblies***Potential Elements of the Performance:**

- Identify valve lead, lag, overlap, and duration.
- Outline the relationship of valves to position of pistons.
- Draw or identify a valve timing events diagram.
- Describe lifters, solid, hydraulic and roller design
- Outline rocker arms and push rods
- Compare overhead valve to overhead camshaft design engines.

2. *Describe the types styles and application of valve trains***Potential Elements of the Performance:**

- Outline different types of drive mechanisms chains, belts, gears and sprockets.
- Outline the purpose of manufacturing engines with overhead camshafts.
- Discuss block camshaft engine operation including push rods, lifters and rocker arms.

3. *Perform recommended service operations.***Potential Elements of the Performance:**

- Remove and install timing belts and chains
- Perform valve adjustment on a variety of styles
- Compression test
- Cylinder leakage test.
- Measure valve lift and duration
- Vacuum test
- Check gear and pump timing on Diesel engines

4. *Discuss common engine machine shop reconditioning equipment and procedures*

Potential Elements of the Performance:

- Inspect component gasket surfaces for nicks, burrs and warpage.
- Outline proper gasket sealing techniques used in the motive power engine repair industry.

Observe the reconditioning operations for:

- Cylinder blocks
- Crankshafts
- Connecting rods
- Cylinder heads

5. *Explore cooling systems.*

Potential Elements of the Performance:

- Perform a leak test
- Test thermostat for opening temperature
- Test PH and freeze point
- Flush system
- Check for combustion signs in cooling system.
- Test and service SCA's in Diesel engines cooling systems.
- Have a clear understanding of the importance of testing PH & SCA's.

6. *Explore lubrication systems.*

Potential Elements of the Performance:

- Test oil pressure
- Check for oil contamination
- Check for leaks
- Describe proper leak testing techniques.
- Replace oil and filters
- Outline oil requirements, API ratings.

III. TOPICS:

1. Camshaft and valve train assemblies
2. Types of valve trains
3. Perform service operations
4. Common engine reconditioning techniques
5. Cooling system diagnosis
6. Lubrication system diagnosis

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**Title:** Heavy Duty Truck Systems**Edition:** 5th ed., 12959#**Author:** Bennett**Publisher:** Thomson Nelson Learning Canada**Title:** Automotive Technology**Edition:** 1st Canadian**Author:** Erjavec**Publisher:** Thomson Nelson Learning Canada

Pen, pencils, calculator, and 3-ring binder

The following items are mandatory for the Shop:

- Shop coat or coveralls
- CSA approved steel toe boots (high top)
- CSA approved safety glasses

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

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.

**Cell phones are not allowed to be on
in the classrooms or shop areas during class time.**

VII. COURSE OUTLINE ADDENDUM:

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

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.