



**I. COURSE DESCRIPTION:**

In this course, you will be exposed to common machine shop and reconditioning operations for engine crankshafts, connecting rods, cylinder block and cylinder heads. You will have a sound understanding of engine lubrication and cooling system diagnosis. Emphasis will be placed on students 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.

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 student will demonstrate the ability to:

**1. *Discuss the purpose and fundamentals of camshaft and valve train assemblies***

Potential Elements of the Performance:

- Define valve lead, lag, overlap, and duration.
- Explain the relationship of valves to position of pistons.
- Draw and interpret a valve timing events diagram.
- Describe lifters, solid, hydraulic and roller design
- Outline rocker arms and push rods
- Compare and contrast 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.
- Explain purpose of manufacturing engines with overhead camshafts.
- Describe in 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. Describe 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. Diagnose 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. Diagnose 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.,

**Author:** Bennett

**Publisher:** Thomson Nelson Learning Canada

**Title:** Automotive Technology

**Edition:** 2nd<sup>t</sup> Canadian

**Author:** Erjavec

**Publisher:** Thomson Nelson Learning Canada

Pen, pencils, calculator, and 3-ring binder

**The following items are mandatory for the Shop:**

- Approved 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 – 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:

<b>Grade</b>	<b><u>Definition</u></b>	<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.	

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

## 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 in D2L and on the portal form part of this course outline.