SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:	INTERNAL COMBUSTION ENGINES		
CODE NO. :	AST602	**LEVEL:**	ONE
PROGRAM:	AUTOMOTIVE SERVICE TECHNICIAN APPRENTICESHIP (6067)		
AUTHOR:	STEPHEN KENT		
DATE:	SEPT 2010	**PREVIOUS OUTLINE DATED:**	MAY 2010
APPROVED:	*"Corey Meunier"* **CHAIR**		**DATE**
TOTAL CREDITS:			
PREREQUISITE(S):			
HOURS/WEEK:			

I. COURSE DESCRIPTION:

The internal combustion engine course has been designed to give the student a sound working knowledge of the construction, operating principles, testing and servicing of internal combustion engine assemblies. It will also give them the opportunity to dismantle short block assemblies for testing and inspection. Engine lubrication and cooling system construction and testing methods will also be discussed. An in depth study of belts and pulleys will be done at this time to explain the construction and proper testing and inspection procedures following manufacturer's recommendations.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1 Explain engine terminology.

Potential Elements of the Performance:
Define and explain the following:

- inertia
- force and energy
- torque
- bore
- stroke
- swept volume
- displacement
- clearance volume
- compression ratio
- compression pressure
- volumetric efficiency
- mechanical efficiency
- thermal efficiency
- horsepower

2 Explain the principles of operation of an internal combustion engines.

Potential Elements of the Performance:
Define and explain the following:

- Otto cycle
- Diesel cycle
- two-stroke
- four-stroke

3 Explain the construction, operating principles, testing and disassembly of internal combustion gasoline engines.

Potential Elements of the Performance:

- Dismantle, inspect, test and assemble engine short block assemblies.
- Measure cylinders to determine taper and out-of-round.
- Explain the construction and composition of cylinder blocks, crankshafts and cylinder heads.
- Demonstrate cylinder ridge removal and engine cleaning.
- Measure warpage, crankshaft wear, bearing wear, camshaft wear and piston wear using manufacturer specifications and precision measuring equipment.

4 Diagnose, inspect and test engine lubrication systems.

Potential Elements of the Performance:

- Test engine oil pressure and compare to specification.
- Explain the construction and operation of crescent and gear pumps.

5 Discuss the construction and testing methods of gasoline engine cooling systems.

Potential Elements of the Performance:

- Compare & contrast liquid cooled versus air-cooled engines.
- Explain the effects of pressure on the boiling point of water.
- Describe cleaning and flushing the cooling systems taking into account proper handling and disposal of antifreeze.
- Test coolant freeze protection.

6 Demonstrate a working knowledge of the purpose, construction, principles of operation, inspection and testing for belts and pulleys.

Potential Elements of the Performance:

- Define the purpose and fundamentals of various belts and pulleys
- Define the purpose and fundamentals of various belts and pulleys
- Explain the principles of operation of belts and pulleys

Perform inspection and testing procedures for belts and pulleys following manufacturers' recommendations.

III. TOPICS:

1 Explain engine terminology.
2 Explain the principles of operation of an internal combustion engines.
3. Explain the construction, operating principles, testing and disassembly of internal combustion gasoline engines.
4. Diagnose, inspect and test engine lubrication systems.
5. Discuss the construction and testing methods of gasoline engine cooling systems.
6. Demonstrate a working knowledge of the purpose, construction, principles of operation, inspection and testing for belts and pulleys.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Automotive Technology First Canadian Edition

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

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

The following semester grades will be assigned to students:

Grade	Definition	*Grade Point Equivalent*
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

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.

VII. COURSE OUTLINE ADDENDUM:

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