SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

SAULT
COLLEGE

COURSE OUTLINE

COURSE TITLE:	INTERNAL COMBUSTION ENGINES III		
CODE NO. :	AST802	**SEMESTER:**	LEVEL 3
PROGRAM:	AUTOMOTIVE SERVICE TECHNICIAN		
AUTHOR:	STEPHEN KENT		
DATE:	JAN 2011	**PREVIOUS OUTLINE DATED:**	JAN 2010
APPROVED:	*"Corey Meunier"* **CHAIR**		
TOTAL CREDITS:			
PREREQUISITE(S):			
HOURS/WEEK:			

For additional information, please contact Corey Meunier, Chair
School of Technology & Skilled Trades
(705) 759-2554, Ext. 2610

I. COURSE DESCRIPTION: This course focuses on cylinder head construction and reconditioning procedures and engine component failure diagnosis. The student will disassemble engines and perform component failure analysis. A comparison of turbochargers and superchargers will be given, focusing on construction, operation and boost control devices.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. ***Describe the engine component failure analysis process.***

   Potential Elements of the Performance:
   - Outline types of engine failures.
   - Identify diagnostic procedures to determine primary and secondary causes of component failure.
   - Describe four types of engine-related noises.
   - Apply compression, cylinder leakage and engine vacuum tests to explain power loss.
   - Explain how to test for oil consumption.
   - Understand how oil pressure is effected by internal engine wear

2. ***Perform inspection and testing procedures to determine internal engine component failure.***

   Potential Elements of the Performance:
   - Disassemble an engine.
   - Inspect internal components for contact.
   - Measure pistons and rings.
   - Measure crankshafts and connecting rods.
   - Inspect bearings
   - Check valve timing.
   - Compare all measurements following manufacturers specifications

3. ***Describe the purpose and fundamentals of turbochargers and superchargers.***

   Potential Elements of the Performance:
   - Explain the relationship of turbo charging or supercharging to volumetric efficiency.
   - Describe the effects air temperature and flow rates.
   - Outline electronic monitoring and boost pressure indicators.

4. ***Outline the construction and operation of turbo chargers and superchargers***

   Potential Elements of the Performance:

   - Compare and contrast superchargers to turbo chargers.
   - Explain the need for an intercooler.
   - Describe boost controls.
   - Explain the lubrication types and methods for super and turbo chargers.
   - Outline service precautions as outlined by manufacturers recommendations.

5. ***Demonstrate a working knowledge of the fundamentals, construction, principles of servicing engine cylinder heads***

   Potential Elements of the Performance:

   - Clean and inspect a cylinder head.
   - Perform crack detection.
   - Measure for warpage.
   - Observe the reconditioning of valves and valve seats.
   - Explain how to resurface a cylinder head.
   - Measure valve stems for wear.
   - Describe combustion chamber shape and design.
   - Determine if valve springs are suitable for re-use.

III. TOPICS:

1. DESCRIBE THE ENGINE COMPONENT FAILURE ANALYSIS PROCESS.
2. PERFORM INSPECTION AND TESTING PROCEDURES TO DETERMINE INTERNAL ENGINE COMPONENT FAILURE.
3. DESCRIBE THE PURPOSE AND FUNDAMENTALS OF TURBOCHARGERS AND SUPERCHARGERS.
4. OUTLINE THE CONSTRUCTION AND OPERATION OF TURBO CHARGERS AND SUPERCHARGERS
5. CYLINDER HEAD CONSTRUCTION AND RECONDITIONING.

IV.

REQUIRED RESOURCES/TEXTS/MATERIALS:

Title: Automotive Technology: A Systems Approach/AST Test Prep
Edition: 06 ed., 17810#
Author: Erjavec
Publisher: Thomson Nelson Learning Canada

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	**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.

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.

VII. COURSE OUTLINE ADDENDUM:

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