SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:	INTRODUCTION TO THERMODYNAMICS		
CODE NO. :	MCH256	**SEMESTER:**	FOUR
PROGRAM:	MECHANICAL TECHNICIAN		
AUTHOR:	MARK S. SEELER		
DATE:	JAN 2012	**PREVIOUS OUTLINE DATED:**	JAN 2011
APPROVED:	"Corey Meunier" **CHAIR**		_____ **DATE**
TOTAL CREDITS:	THREE		
PREREQUISITE(S):			
HOURS/WEEK:	THREE		

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

I. COURSE DESCRIPTION:

The general objective of this course is to give students destined for the mechanical trades an introduction to thermodynamics. The course covers temperature, pressure, volume relationships for gases, specific heat, the relationship between heat and work, heat engines and heat transfer.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Behavior of Gases

Potential Elements of the Performance:
Demonstrate an understanding of perfect gases under the following conditions:

a. Constant temperature (Boyle's Law)
b. Constant volume (Charles's Law)
c. Constant pressure (Gay-Lussac's Law)
d. Varying temperature, volume and pressure (General Gas Law)
e. Mixed gases (Dalton's Law of Partial Pressures)

2. Specific Heat

Potential Elements of the Performance:

- Define and calculate specific heats under conditions of constant volume and constant pressure.

3. 1st and 2nd Laws of Thermodynamics

Potential Elements of the Performance:

- Explain the concept of heat
- Explain the first and second law of thermodynamics to demonstrate an understanding of the relationship between heat, energy and work.

4. Work

Potential Elements of the Performance:
Calculate the work done under the following conditions:

a. Constant pressure
b. Constant Temperature
c. Adiabatic expansion and compression
d. Polytropic Compression and expansion

5. Practical Thermodynamic Cycle - Heat Engines

Potential Elements of the Performance:

- Explain the concept of a heat engine.
- Identify the application for each of the following thermodynamic cycles:
  a. Carnot
  b. Rankine
  c. Otto
  d. Diesel
  e. Brayton

6. Heat Transfer

Potential Elements of the Performance:

- Explain the concepts of heat transfer through conduction, convection and radiation.
- Utilize the equations for heat transfer.

III. TOPICS:

1. BEHAVIOR OF GASES
2. SPECIFIC HEAT
3. HEAT AND WORK
4. 1^{ST} AND 2^{ND} LAWS OF THERMODYNAMICS
5. PRACTICAL THERMODYNAMIC CYCLE - HEAT ENGINES
6. HEAT TRANSFER

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Text book will be provided by instructor on LMS.

V. EVALUATION PROCESS/GRADING SYSTEM:

Class participation – 10%
Assignments – 35%
Test #1 - 25%
Test #2 – 30%

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.

VII. COURSE OUTLINE ADDENDUM:

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