

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: INTRODUCTION TO THERMODYNAMICS
CODE NO. : MCH256 **SEMESTER:** 2
PROGRAM: Mechanical Technician
AUTHOR: R. ACKERT
DATE: Dec 07 **PREVIOUS OUTLINE DATED:** Jan 07
APPROVED:

	_____	_____
	CHAIR	DATE

TOTAL CREDITS: 3
PREREQUISITE(S):
HOURS/WEEK: THREE

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For additional information, please contact Corey Meunier, Chair
School of the Natural Environment, 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 ThermodynamicsPotential 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. 1st and 2nd Laws of Thermodynamics
5. Practical Thermodynamic Cycle - Heat Engines
6. Heat Transfer

IV. REQUIRED RESOURCES/TEXTS/MATERIALS: NONE

V. EVALUATION PROCESS/GRADING SYSTEM:

Class participation – 20%

Assignments – 30%

Test #1 - 25%

Test #2 – 25%

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:**Special Needs:**

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 703 so that support services can be arranged for you.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. Students who engage in academic dishonesty will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.