

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: Technical Mathematics I

CODE NO. : MTH145 SEMESTER: One

PROGRAM: Engineering Technician and Technology Programs

AUTHOR: Mathematics Department

DATE: June 2010 PREVIOUS OUTLINE DATED: Sept 2009

APPROVED: "B. Punch"

	CHAIR	DATE
TOTAL CREDITS:	5	
PREREQUISITE(S):	None	
HOURS/WEEK:	4	

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I. COURSE DESCRIPTION:

This first level mathematics course for engineering technology programs begins with a review of fundamental concepts including arithmetic operations and concepts in measurement. This is followed by several algebra topics including linear equations, factoring, fractions and quadratic equations. A treatment of trigonometry of right triangles, the trigonometric functions of any angle and of oblique triangles is also included.

The goals of this course are, first, to show that mathematics does play a most important role in the development and understanding of the various fields of technology and, secondly, to ensure that students acquire the mathematical and critical thinking skills necessary to analyze and solve engineering technology problems.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Topic 1: Basic Algebraic Operations

1. Perform basic arithmetic operations on signed numbers.
2. Take powers, roots, and reciprocals of signed numbers and algebraic quantities.
3. Convert numbers between decimal and scientific notation.
4. Simplify expressions by removing grouping symbols and combining like terms.
5. Add, subtract, multiply, and divide algebraic expressions.
6. Solve simple linear equations, and solve literal equations for the indicated letter.

2. Topic 2: Units of Measurement and Approximate Numbers

1. Convert units of measurement from one system to another
2. Perform basic arithmetic operations on approximate numbers.

3. Topic 3: Trigonometric Functions

- Convert angles between decimal degrees, radians, and degrees, minutes and seconds.
2. Find the trigonometric functions of an angle.
 3. Find the missing sides and angles of a right triangle.
 4. Solve practical problems involving the right triangle.

4. **Topic 4: Systems of Linear Equations**
 1. Find an approximate graphical solution to a system of two equations.
 2. Solve a system of two equations and two unknowns by the addition-subtraction methods and by the substitution method.

5. **Topic 5: Factoring and Fractions**
 1. Factor expressions by removing common factors.
 2. Factor binomials that are the difference of the two squares.
 3. Reduce algebraic fractions.
 4. Re-arrange formulas involving fractions.

6. **Topic 6: Quadratic Equations**
 1. Solve using the Quadratic Formula

7. **Topic 7: Trigonometric Functions of any Angle**
 1. Identify the algebraic sign of a given trigonometric function for an angle in any quadrant
 2. Find a trigonometric function for any angle using a calculator
 3. Convert angles between radians, degrees and revolutions

8. **Topic 8: Vectors and Oblique Triangles**
 1. Determine the resultant of two or more vectors
 2. Resolve a vector into its components
 3. Solve applied problems requiring vectors
 4. Solve oblique triangles using the law of sines and the law of cosines
 5. Solve applied problems requiring oblique triangles

III. TOPICS:

1. Basic Algebraic Operations	12 hours
2. Units of Measurement	6 hours
3. The Trigonometric Functions	10 hours
4. Systems of Linear Equations	5 hours
5. Factoring and Fractions	7 hours
6. Quadratic Equations	3 hours
7. Trigonometric Functions of any Angle	12 hours

III a. LEARNING ACTIVITIES:

TOPIC	TOPIC DESCRIPTION	Practice Questions
1.0	BASIC ALGEBRAIC OPERATIONS	Chapter 1
1.1	Numbers and literal symbols	Questions 1-44, p. 5
1.2	Fundamental laws of algebra and order of operations	Questions 1-64, p. 10
1.3	Calculators and approximate numbers	Questions 1-60, p. 15
1.4	Exponents	Questions 1-68, p. 20
1.5	Scientific notation/Engineering Notation	Questions 1-56, p. 23
1.6	Roots and radicals	Questions 1-56, p. 25
1.7	Addition and subtraction of algebraic expressions	Questions 1-56, p. 29
1.8	Multiplication of algebraic expressions	Questions 1-64, p. 31
1.9	Division of algebraic expressions	Questions 1-52, p. 34
1.10	Equations	Questions 1-52, p. 38
1.11	Formulae and literal equations	Questions 1-48, p. 40
2.0	UNITS OF MEASURE AND APPROXIMATE NUMBERS	
2.1	The metric system	Questions - Appendix B p. A-2
3.0	THE TRIGONOMETRIC FUNCTIONS	Chapter 4
3.1	Angles	Questions: 1-56, Page 111
3.2	Defining the trig. functions	Questions: 1-36, Page 115
3.3	Values of the trig. functions	Questions: 1-58, Page 118
3.4	The right triangle	Questions: 1-44, Page 123
3.5	Applications of right triangles	Questions: 1-40, Page 126
4.0	SYSTEMS OF LINEAR EQUATIONS	Chapter 5
4.1	Linear equations	Questions: 1-30, Page 137
4.2	Graphs of linear equations	Questions: 1-42, Page 141
4.3	Solving systems of two linear equations in two unknowns graphically	Questions: 1-38, Page 145
5.0	FACTORING AND FRACTIONS	Chapter 6
5.1	Common factor and difference of squares	Questions: 1-76, Page 181
5.2	Equations involving fractions	Questions: 33-48, Page 207
6.0	QUADRATIC EQUATIONS	Chapter 7
6.1	The Quadratic Formula	Questions: 1-58, Page 222
7.0	TRIGONOMETRIC FUNCTIONS OF ANY ANGLE	Chapter 8
7.1	Signs of trigonometric functions	Questions 1-42, p. 234
7.2	Trigonometric functions of any angle	Questions 1-54, p. 239
7.3	Radians	Questions 1-74, p. 243
8.0	VECTORS AND OBLIQUE TRIANGLES	Chapter 9
8.1	Introduction to vectors	Questions 1-48, p. 258
8.2	Components of vectors	Questions 1-34, p. 261
8.3	Vector addition by components	Questions 1-34, p. 267
8.4	Application of vectors	Questions 1-36, p. 271
8.5	Oblique triangles, the Law of Sines	Questions 1-40, p. 278
8.6	The Law of Cosines	Questions 1-40, p. 283

REQUIRED RESOURCES/TEXTS/MATERIALS:

- IV. 1. Basic Technical Mathematics with Calculus (9th Edition) Washington, SI Version, Addison-Wesley, Pearson, 2010
2. **Calculator:** -
SHARP Scientific Calculator EL-520W (Civil students), otherwise any scientific calculator.
- Note: The use of some kinds of calculators and other electronic devises may be restricted during tests.*

EVALUATION PROCESS/GRADING SYSTEM:

Evaluation will consist of two components:

- i) four in class term tests worth 70%
- ii) assignments and quizzes worth 30%

The following semester grades will be assigned to students:

Grade	Definition	<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. 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.