SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

SAULT
COLLEGE

COURSE OUTLINE

COURSE TITLE:	Technical Mathematics I		
CODE NO. :	MTH142-5	**SEMESTER:**	One
PROGRAM:	Engineering Technician and Technology Programs		
AUTHOR:	Mathematics Department		
DATE:	June 2012	**PREVIOUS OUTLINE DATED:**	May 2011
APPROVED:	"Brian Punch"		Aug/2012
	_____ **CHAIR**		_____ **DATE**
TOTAL CREDITS:	5		
PREREQUISITE(S):	None		
HOURS/WEEK:	4		

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 solve problems in the following topic areas:

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**
    1. 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.
    3. Solve a system of two equations and two unknowns or three equations and three unknowns using determinants.

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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. Factor trinomials.
    4. Reduce algebraic fractions.
    5. Add, subtract, multiply and divide algebraic fractions.
    6. Solve fractional equations.

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

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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.
    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:

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1. Basic Algebraic Operations 10 hours
2. Units of Measurement 6 hours
3. The Trigonometric Functions 8 hours
4. Systems of Linear Equations 7 hours
5. Factoring and Fractions 10 hours
6. Quadratic Equations (excluding completing the square) 6 hours
7. Trigonometric Functions of any Angle 6 hours
8. Vectors and Oblique Triangles 7 hours

TOPIC NUMBER	TOPIC DESCRIPTION	**REFERENCE CHAPTER ASSIGNMENTS**
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	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
1.12	Review exercise	Questions 1-106, p. 46
2.0	**UNITS OF MEASURE AND APPROXIMATE NUMBERS**	
2.1	The metric system	Questions - Appendix B p. A-9

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
3.6	Review exercise	Questions: 1-95, Page 130

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
4.4	Solving systems of two linear equations in two unknowns algebraically	Questions: 1-60, Page 151
4.5	Solving systems of two linear equations in two unknowns by determinants	Questions: 1-52, Page 157
4.6	Solving systems of three linear equations in three unknowns algebraically	Questions: 1-32, Page 161
4.7	Solving systems of three linear equations in three unknowns by determinants	Questions: 1-44, Page 167
4.8	Review exercise	Questions: 1-95, Page 169
5.0	**FACTORING AND FRACTIONS**	**Chapter 6**
5.1	Special products	Questions: 1-80, Page 176
5.2	Common factor and difference of squares	Questions: 1-76, Page 181
5.3	Factoring trinomials	Questions: 1-74, Page 187
5.4	Sum and difference of cubes	Questions: 1-38, Page 189
5.6	Multiplication and division of fractions	Questions: 1-48, Page 197

5.7	Addition and subtraction of fractions	Questions: 1-68, Page 202
5.8	Equations involving fractions	Questions: 1-60, Page 207
5.9	Review exercise	Questions: 1-132, Page 209
6.0	**QUADRATIC EQUATIONS**	**Chapter 7**
6.1	Solution by factoring	Questions: 1-54, Page 216
6.2	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 1-56, p. 239
7.3	Radians	Questions 1-74, p. 243
7.4	Applications of the use of radians	Questions 1-62, p. 248
7.5	Review exercise	Questions 1-92, p. 251
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. 270
8.5	Oblique triangles, the Law of Sines	Questions 1-40, p. 278
8.6	The Law of Cosines	Questions 1-40, p. 283
8.7	Review exercise	Questions 1-70, p. 285

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

1. Basic Technical Mathematics with Calculus (9^{th} Edition) Washington, SI Version, Addison-Wesley, Pearson, 2010

Calculator: (Recommended)

a) Electrical, Electronics, Computer Engineering **– SHARP Scientific Calculator EL-520 (has complex numbers capability);**

b) All other Engineering – **SHARP Scientific Calculator EL-531**

Note: The use of some kinds of calculators and other electronic devises may be restricted during tests.

V. EVALUATION PROCESS/GRADING SYSTEM:

Evaluation will consist of four in class term tests worth 25% each.

Course: MTH 142-5		
Evaluation Device	**Topics Covered** (reference topic numbers from the course outline)	**% weight of Final Aver**
Test 1	1-2	25%
Test 2	3-4	25%
Test 3	5-6	25%
Test 4	7-8	25%

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.

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 be of all its constituents, all students are encouraged to attend all of their sche learning and evaluation sessions. This implies arriving on time and remainir 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.

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