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:	**May 2009**	**PREVIOUS OUTLINE DATED:**	**June 2008**
APPROVED:	"B. Punch"		
	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:

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.
    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:

1. Basic Algebraic Operations	10 hours
2. Units of Measurement	6 hours
3. The Trigonometric Functions	10 hours
4. Systems of Linear Equations	7 hours
5. Factoring and Fractions	11 hours
6. Quadratic Equations (excluding completing the square)	6 hours
7. Trigonometric Functions of any Angle	5 hours

III a. LEARNING ACTIVITIES:

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
5.5	Equivalent fractions	Questions: 1-72, Page 193

TOPIC NUMBER	TOPIC DESCRIPTION	REFERENCE CHAPTER ASSIGNMENTS
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 two components:

i) three in class term tests worth 25% each

ii) homework assignments and quizzes from MathXL, worth 25% in total

In order to pass, a student must:

i) obtain at least 50% as an average of the three in class tests

ii) obtain an overall average of at least 50% when the MathXL portion is averaged in.

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. 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.

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.

Prior Learning Assessment**:**
Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

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

Disability Services:
If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

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*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade "C", (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. 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.

Student Portal:
The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations, in addition to announcements, news, academic calendar of events, class cancellations, your learning management system (LMS), and much more. Go to https://my.saultcollege.ca.

VII. Electronic Devices in the Classroom:
Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

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.

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