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SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: TECHNICAL MATHEMATICS

CODE NO MTH142-5 **SEMESTER:**

PROGRAM; MECKANICAL/ELECTRICAL/ELECTRONICS/COMPUTER ARCHITECTURAL/CIVIL TECHNICIAN

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DATE: AUGUST 1993 **PREVIOUS OUTLINE DATED** NEW

APPROVED DEAN, SCHOOL OF SCIENCES & NATURAL RESOURCES DATE

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TECHNICAL MATHEMATICS **MTH142-5**

COURSE NAME **COURSE NUMBER**

TOTAL CREDIT HOURS: 85

PRER£QUISITE(S): Grade 12 Technical Mathematics

I, PHILOSOPHY/GOALS:

This first level mathematics course for engineering technology programs begins with a review of fundamental concepts, arithmetic operations, and units of measurement. This is followed by an in depth study of basic algebra, trigonomerric and other functions, and quadratic equations.

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. TERMINAL PERFORMAKCS OBJECTIVES

After studying each of the following topics, the student should be abie to:

Topic 1: **Fundamental Concepts and Operations**

1 Perforra 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.
5 Solve simple linear equations, and solve literal equations for the indicated letter.

Topic 2: **Functions and Graphs**

1 Distinguish between relations and functions.
2 Graph points, relations and functions.
3 Solve equations graphically.

Topic 3: **Variation**

1 Describe the differenca between a ratio and a proportion.
2 Set up and solve a proportion for a missing quantity.
3 Set up and solve problems involving direct variation, inverse variation, joint variation, and combined variation

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II. TERMINAL PEREORMANCE OBJECTIVES (confd)

Topic 4: **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.

Topic 5: **Analytic Geometry of the Straight Line**

1 Caiculate the distance between two points.
2 Determine the slope of a line given two points on the line, or given its angle of inclination.
3 Determine the slope of a line parallel or perpendicular to a given line.
4 Write the equation of a line using the slope-intercept form, the point-slope form, or the two-point form.

Topic 6: **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.

Topic 7: **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.

Tcpic 8: **Exponents and Radicals**

1 Use the laws of exponents to simplify and combine expressions having integral exponents.
2 Simplify radicals by removing perfect powers and by rationalizing the denominator.
3 Add, subtract, multiply and divide radicals.

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II. TERMINAL PERFORMANCE OBJHCTIVES (confd)

Topic 9: **Quadratic Squations**

1 Solve quadratic equations by factoring, by completing the square, and by quadratic formula.
2 Graph quadratic equations.

Topic 10: **Additional Types and Systems of Squations**

1 Solve systems of equations involving quadratic equations graphically and algebraically.
2 Solve equations in quadratic form.
3 Solve radical equations that lead to quadratics.

III, TOPICS TO BE COVERED:	**TIME FRÅME:**
1. Fundamental Concepts and Operations.	12 periods
2. Functions and Graphs.	8 periods
3. Variation	4 periods
4. The trigonometric Functions.	10 periods
5. Analytic Geometry of the Straight Line	7 periods
5. Systems of Linear Equations.	5 periods
7. Factoring and Fractions.	12 periods
3. Exponents and Radicais	11 periods
9. Quadratic Equations.	6 periods
10. Addition Types and Systems of Equations	9 periods

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IV, LEARNING ACTIVITIES:	**REQUIRED RESOURCES:**
1.0 Fundamental Concepts and Qperations	Chapter 1
1.1 Numbers and literal symbols.	Questions 1 - 36, p. 5
1.2 Fundamental laws of algebra and order of operations.	
1.3 Operations with zero.	Questions 1 - 52, P- 11
1.4 Exponents.	Questions 1 - 60, P- 19
1.5 Scientific notation.	Questions 1 - 48, P- 23
1.0 Roots and radicals.	Questions 1 - 44, P-,25
1.7 Addition and subtraction of algebraic expressions.	Questions 1 - 44, P-,31
1.3 Multiplication of algebraic expressions.	Questions 1 - 56, P-,33
1.3 Division of algebraic expressions.	Questions 1 - 40, p.37
1.10 Equations.	Questions 1 - 36, p.40
1.11 Formålas and literal equations.	Questions 1 - *3Sr* p.43
1.12 Review exercise.	Questions 1 - 104, P-51
2.Q Functions and Graphs	Chapter 2
2.1 Introduction to functions.	Questions 1 - 36, P-.58
2.2 Rectangular coordinates.	Questions 1 - 27, P'.66
2.3 The graph of a function.	Questions 1 - 32, P'.71
2.4 Solving equations graphicaliy	Questions 1 - 28, P'.79
2.5 Review exercise.	Questions 1 - 52, P .80
3.0 Variation	Chapter 17
3.1 Ratio and proportion.	Questions 1-36, p.489
3.2 Variation.	Questions 1-48, p.495
3.3 Review exercise.	Questions 1-48, p.497
0 The Triqonometric unctions	Chapter 3
4.: Angles.	Questions 1 •- 44, p.37
4.2 Defining the trig. functions.	Questions 1 -- 32, p.91
4.3 Values of the trig functions.	Questions 1 -- 40, p.96
4.4 The right triangle	Questions 1 -- 35, p.lOO
4.5 Applications of ri* ht triangles.	Questions 1 -- 27, p.l03
4.5 Review exercise.	Questions 1 -- 76, p.l05

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IV, LEARNING ACTIVITIES: fconfd	REQUIRED RESOURCES:
5.0 Systems of Linear Equations	Chapters 4 and 20.
5.I Basic Definitions.	Questions 1-40, p.563
5.2 Graphs of Linear Equations.	Questions 1-33, p.ll6
5.3 The Straight Line.	Questions 1-43, p.569
6.0 Systems of Linear Equations	Chapter 4.
6.1 Linear equations.	Questions 1 20, p.112
6.2 Solving systems of two linear equations in two unknowns graphically.	Questions 1 30, p.119
6.3 Solving systems of two linear equations in two unknowns algebraically.	Questions 1 - 36, p. 125
6.4 Solving systems of two linear equations in two unknowns by determinants.	Questions 1 - 32, p.131
Solving systems of three linear equations in three unknowns algebraically.	Questions 1 - 14, p.137
Solving systems of three linear equations in three unknowns by determinants.	Questions 1 - 28, p.143
6.7 Review exercise.	Questions 1 - 74, p.l45
7.0 Factoring and Fractions	Chapter 5
7.1 Special products.	Questions 1 68, p.152
7.2 Common factor and difference of squares.	Questions 1 60, p.l56
7.3 Factoring trinomiais.	Questions 1 60, p.l62
7.4 Equivalent fractions.	Questions 1 60, p.l66
7.5 Multiplication and division of fractions.	Questions 1 40, p.l70
7.0 Addition and subtraction of fractions.	Questions 1 - 52, p.l76
7.7 Equations involving fractions.	Questions 1 - 44, p.lBO
7.3 Review exercise.	Questions 1 - 104, p.l82
8.0 Exponents and Radicals	Chapter 10
8.i Integral exponents.	Questions 1-64, p.292
3.2 Fractional exponents.	Questions 1-68, p.297
3.3 Simplest radical form.	Questions 1-54, p.301
3.4 Additional and subtraction of radicals.	Questions 1-44, p.304
3.5 Multiplication of radicals	Questions 1-60, p.307
8.6 Division of radicals.	Questions 1-52, p.310
3.7 Review exercise.	Questions 1-88, p.312

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IV. LEAHNING ACTIVITIES: (confd)	**REQUIRED RESOURCES:**
9.0 Quadratic Equations	Chapter 6
Solution by factoring.	Questions 1 47, p.l89
Completing the square.	Questions 1 24, p.l93
The quadratic formula.	Questions 1 35, p.l97
The graph of the quadratic function.	Questions 1 24, p.202
9.5 Review exercise.	Questions 1 60, p.202
10.0 Additional Types of Equations and Systems of Equations	Chapter 13
10.1 Graphicai Solution of Systems of Equations.	Questions 1-16, p.386
10.2 Algebraic Solution of Systems of Equations.	Questions 1-24, p.391
10.3 Equations in Quadratic Form.	Questions 1-16, p.395
10.4 Equations with Radicals.	Questions 1-26, p.398

V. METHOD OF EVALUATION:

1. Four - five tests per semester. Test questions will be of near equal difficulty to questions assigned in the exercises.

2. Final grade is a weighted average of these tests.

90 - 100 = A+
80 - 89 = A
65 - 79 = B
55 - 64 = C
0 - 54 = R i;or X)

A credit for this course may be allowed upon presentation (MAGOA) of proof of standing in the appropriate grade 13 mathematics course (MAGGA). A score of 70% (or better) in the pre-test must be achieved as well.

All tests are scheduled in advance. Hence, attendance is mandatory. Unexcused absence from a test will resuit in a mark of zero for that test. If a student is prevented from writing a test by illness, the instructor should be notified befora the time of the test. Upon return to Glass, the student shculd see the instructor immediately to arrange a time for a make-up test. The student should have a note from the college nurse or a doctor.

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VI. REQUIRED STUDENT RESOURCES:

1. Text: Washington, Basic Technical Mathematics with Calculus, Fifth edition, metric version. Benjamin/Cummings Pub. Co. 1990.

2, Calculator: Recormnended; SHARP Scientific calculator EIJ-531G.

VII. SPECIAL NOTES:

Students with special needs (e.g. physical limitations, visuai Impairments, hearing impairments, learning disabiiities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.