

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: MATHEMATICS
Code No.: MTH 220-4
Program MECHANICAL TECHNICIAN
Semester: II
Date: JUNE, 1984
Author: W. MACQUARRIE

New:

Revision:

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Date

CALENDAR DESCRIPTION

MATHEMATICS

MTH 220-4

Course Name

Course Number

PHILOSOPHY/GOALS:

Exponents, radicals, logarithmic relationships, solution of quadratic and radical equations, ratio and proportion, analytical trigonometry, trigonometry of the oblique triangle, radian measure, trigonometric identities and equations.

METHOD OF ASSESSMENT (GRADING METHOD):

The students will be assessed by tests. These tests will include periodic tests based upon blocks of subject matter and may, at the instructor's discretion include unannounced surprise tests on current work and/or a final test on the whole course. A letter grade will be based upon a student's weighted average of his test results. See also the mathematics department's annual publication "To the Mathematics Student" which is presented to the students early in each academic year.

TEXTBOOK(S):

Person, "Essentials of Mathematics" - Wiley, 4th Edition.

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NOTES;

The course outline covers the second semester mathematics for technicians in the Mechanical Technician program.

For demonstrating solutions to Quadratic Equations, the film strips No.'s 1114 and 1150 can be used as instructional aids.

*The laws of Sines and Cosines can also be demonstrated by film strips No.'s 1158 and 1169 respectively. When possible, subject-related problems should be given for application.

TOPICAL OBJECTIVES;

1. Logarithms;

The student will be required to:

- a) Understand the definition of a logarithm and be able to convert a simple exponential equation to an equivalent logarithmic equation and vice-versa.
- b) Be able to plot and recognize graphs of simple logarithmic and exponential functions and be able to distinguish these from graphs of power functions.
- c) Know and be able to apply the properties of logarithms to the simplification of logarithmic expressions.
- d) Be able to find the common logarithm of a number and common antilogarithms.
- e) Be able to use common logarithms in computations of products, quotients, powers and roots and combinations of these.
- f) Be able to use natural logarithms as in d) and e) above.
- g) Be able to solve basic exponential and logarithmic equations including the evaluation of a logarithm of any positive number to any stated base.

2. Quadratic Equations:

The student will be required to;

- a) Recognize and solve quadratic equations by factoring, completing the square, quadratic formula and where possible, by graphing.

TOPICAL OBJECTIVES - Continued

2. Quadratic Equations - Continued

- b) Be able to use the discriminant to identify the kind of roots a quadratic equation has without solving the equation-
- c) Be able to solve radical equations including the rejection of extraneous roots.
- d) Be able to recognize the possibility and reduce other types of equations of quadratic form and solve them using quadratic equation methods, including the rejection of all extraneous roots.
- e) Know the properties of a quadratic curve.
- f) Solve applied problems which involve quadratic or radical equations and verify the results without reference to any derived equation (such problems may involve SI and English units).

3' Vectors and Oblique Triangles:

The student will be required to:

- a) Be able to find any trigonometric functions of any angle.
- b) Be able to use radian angle measure in solving problems.
- c) Be able to add and subtract vectors and apply them in the solution of problems.
- d) Be able to solve problems involving oblique triangles by use of the sine and cosine laws.

4. Graphs of Trigonometric Functions;

The student will be required to:

- a) Understand and use the concepts of amplitude, period, frequency and phase angle.
- b) Plot curves of trigonometric and inverse trigonometric functions.
- c) Plot curves of composite trig functions.

TOPICAL OBJECTIVES - Continued

5. Trigonometric Identities, Equations and Inverse Functions:

The student will be required to:

- a) Know the basic identities of the following types and be able to use them in proving identities: reciprocal functions, sin-cos-tan relationships and Pythagorean relationships.
- b) Know the sum and difference formulas, the double angle formulas and the half angle formulas and be able to apply them to practical problems and to the proof of identities.
- c) Be able to solve trigonometric equations involving single and multiple angles.
- d) Be familiar with and able to evaluate the inverse trigonometric functions.

OBJECTIVES:

The basic objective is for the student to develop an understanding of the method studied, knowledge of the facts presented and an ability to use these in the solution of problems. For this purpose exercises are assigned. Tests will reflect the sort of work contained in the assignments. The level of competency demanded is the level required to obtain an overall passing average in the tests. The material to be covered is listed on the following pages.

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TOPIC NO	PERIODS	TOPIC DESCRIPTION	REFERENCE
		<u>REVIEW OF BASIC ALGEBRA</u>	
		Exponents and radicals Powers and roots	Ch. 16 & 17
	13	<u>LOGARITHMS</u>	
		Definition of Logarithms	Ch. 33,Sec.1-5
		Graphs	Ch. 34
		Properties of Logarithms	Ch. 35,Sec.2-5
		Common Logarithms	
		Computations with Logarithms	
		Natural Logarithms	
		Exponential and Logarithmic Equations	
	6	<u>RATIO, PROPORTION & VARIATION</u>	Ch. 23
	10	<u>QUADRATIC EQUATIONS</u>	
		Definition and Verification	Ch. 18, 20
		Solution by Factoring	(Ch. 21 - optional)
		Completing the Square	
		Solution by Formula	
		The Discriminant	
		Graphical Solution	
		Equations Solved by Quadratic Methods	
		Radical Equation	
	10	<u>VECTORS AND OBLIQUE TRIANGLES</u>	
		Functions of all Angles	Ch.39,41,44,45
		Applications of Radian Measure	St Manuscript
		Vectors	
		Vector Problems	
		Sine Law	
		Cosine Law	
		Problems	
		<u>GRAPHS OF TRIGONOMETRIC FUNCTIONS</u>	
		Introduction	Ch. 46
		Amplitude, Period, Frequency, Phase Angle	
		Composite Trig. Functions	
		Applications	

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
		<u>TRIGONOMETRIC IDENTITIES, EQUATIONS AND INVERSE FUNCTIONS</u>	
		Reciprocal Functions Sin-Cos-Tan Relationships Pythagorean Relationships Functions of A + B Double Angle Formulas Half Angle Formulas Identities	Ch. 40, 42, 43
		<u>AREAS OF TRIANGLES</u>	
		Problems requiring use of right triangle and oblique triangle trigonometry	Rice & Knight pp. 468-472 pp. 490-499