SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE MARIE, ON

COURSE OUTLINE

Course Titie: Mathematics

Code No.: Mth 143-5   **Semester:** Winter

Program; **Mechanical / Electrical / Electronics / Computer /**
          Architectural / Civil Technician

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Date: January 1998   **Previous Outline Dated:**
June 1997

Approved: *%Loclcc/^^^J}^^*   (L-»^   9ff^
          ^   **Dean**   ^   **Date**

Total Credits: 5   **Prerequisite(s):** Mth 142
Substitutes: Mth 220, Mth 221, Mth 426, Mth 251, Mth 612
Total Credit Hours: 84

L   COURSE DESCRIPTION:

This course is a continuatlon of MTH 142-5 (from Semester One) for engineering technology students. Topics of study include plane analytic geometry, geometry, complex numbers, and functions including trigonometric, exponential and logarithmic functions. This course also indudes an introduction to statistics.

The goals of this course are, first to show that mathematics does plan 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 chtical thinking skills necessary to analyze and solve engineering technology problems.

il.   LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

A.   Leaming Outcomes and Elements of the Performance:

Upon successfui compietion of this course, students wiil demonstrate the ability to:

Topic 1: <u>Units of Measurement and Approximate Numbers</u>
1. Convert units of measurement from one system to another
2. Perform basic arithmetic operations on approximate numbers.

Topic 2: <u>Geometry</u>
1. Solve practical problems to find the sides and angles of right triangles
2. Solve practical problems to find the areas of a triangle or quadrilateral
3. Solve problems involving the circumference, diameter, area or tangent to a circle
4. Compute surface areas and volumes of spheres, cylinders, cones and other solid figures

Topic 3: <u>Plane Analytic Geometr/</u>
1. Write the equatlon of a line using the slope-intercept form, the point-slope form or the two-point fonn
2. Write the equation of a circle, ellipse or parabola from given information
3. Make a graph of any of the above conic sections

Topic 4: <u>Trigonometric Functions of any Angle</u>
1. Identify the aigebraic sign of a given trig function for an angle in any quadrant
2. Find a trig function for any angle using **a** calculator
3. Convert angles between radians, degrees and revolutions

Topic 5: <u>Vectors and Oblique Triangles</u>
1. Detenmine 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

II.   LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE (Continued):

Topic6: <u>Complex Numbers</u>
1. Write complex numbers in rectangular, polar, trigonohietric and exponentlal fonns
2. Graph complex numbers in both rectangular and polar form
3. Find the sum, differences, products, quotients, powers and roots of complex numbers

"^0P'C 7: <u>Graphs of Trigonometric Functions</u>
1. Find the amplitude, period, frequency and phase angle for a sine wave or cosine wave
2. Write the sine function or cosine function, given the amplitude, period and phase
3. Graph the sine function, cosine function or tangent function

TopicS: <u>Additional Topics in Trigonometry</u>
1. Simplify a trigonometric expression using the fundamental identities
2. Prove trigonometric identities using the fundamental identities
3. Simplify expressions or prove identities using the sum or difference fomnulae *or* double-
    angie formulae
4. Solve trigonometric equations
5. Evaluate inverse trigonometric functions

TopicQ; <u>Exponential and Logarithmic Functions</u>
1. Define the logarithmic and exponential function
2. Graph logarithmic and exponential functions
3. Convert expressions between exponential and logarithmic form
4. Evaluate, manipulate and simplify logarithmic expressions
5. Solve exponential and logarithmic equations

Topic 10: <u>Statistics</u>
1. Organize data into frequency distributions, frequency histograms or frequency polygons
2. Calculate the mean, median and mode
3. Calculate the range and standard of deviation

111.   TOPICS:

		Approximate Time Frame (no. of hours)
1	Units of measurement and approximate numbers	5
2	Geometry (Architectural/Civil oniy)	9
3	Plane Analytic Geometry	11
4	Trigonometric functions of any angle	3
5	Vectors and oblique triangles	7
6	Complex numbers (Electrical / Electronics / Computer only	9
7	Graphs of Trigonometric functions	5
8	Additional topics in Trigonometry	8
9	Exponential and Logarithmic functions	11
10	Statistics	5

IV, LEARNING ACTIVITIES:

1.0 Units of Measurement and Approximate Number;s
1.1 The metric system (SI)   Question 1-40, p. A-9
                                                      Appendix B
2.1 Calculators and approximate numbers   Questions 1-52, p. 15
2.0 Geometry   Chapter 2
2.1 Lines and angles   Questions 1-24, p. 51
2.2 Triangles   Questions 1-36, p. 57
2.3 QuadriPaterals   Questions 1-28, p. 61
2.4 Circles   Questions 1-30, p. 64
2.5 Solid Geometric figures   Questions 1-24, p. 70
2.6 Review exercises   Questions 1-56, p. 72   -
3.0 Plane Analytic Geometry   Chapter 21
3.1 Basic definitions   Questions 1-36, p. 540
3.2 The straight line   Questions 1-40, p. 545
3.3 The circle   Questions 1-32, p. 551
3.4 The parabola   Questions 1-29, p.555
3.5 The ellipse   Questions 1-31, p. 560
3.6 Translation of axes   Questions 1-28, p. 569
                                                      (Omit hyperbolic questions)
4.0 Trigonometric functions of any angle   Chapter 8
4.1 Signs of trigonometric functions   Questions 1-24, p. 220
4.2 Trigonometric functions of any angle   Questions 1-56, p. 226
4.3 Radians   Questions 1-60, p. 231
4.4 Applications of the use of radians   Questions 1-40, p. 235
4.5 Review exercise   Questions 1-72, p. 238
5.0 Vectors and Oblique Triangles   Chapter 9
5.1 Introduction to vectors   Questions 1-36, p. 244
5.2 Components of vectors   Questions 1-24, p. 247
5.3 Vector addition by components   Questions 1-24, p. 252
5.4 Application of vectors   Questions 1-24, p,.255
5.5 Oblique triangles, the sine law   Questions 1-32, p. 262
5.6 The law of cosines   Questions 1-32, p,.267
5.7 Review exercise   Questions 1-56, p..268
6.0 Complex Numbers   Chapter 12
6.1 Basic definitions   Questions 1-52, p.322
6.2 Basic operations with complex numbers   Questions 1-60, p.325
6.3 Graphica! representation of complex numbers   Questions 1-32, p.327
6.4 Polar form of complex numbers   Questions 1-40, p.330
6.5 Exponential form of a complex number   Questions 1-32, p.333
6.6 Products, quotients, powers and roots of complex numbers   Questions 1-40, p.339
6.7 Review exercise   Questions 1-68, p.347

IV. LEARNING ACTIVITIES (confd):

7.0	**Graphs of Trigonometric Functions**	ChapterIO
7.1	Graphs of $y = A\sin x$ and $y = A\cos x$	Questions 1-20, p. 274
7.2	Graphs of $y = A\sin bx$ and $y = A\cos bx$	Questions 1-20, p. 277
7.3	Graphs of $y = A\sin(bx+c)$ and $y = A\cos(bx+c)$	Questions 1-24, p. 281
7.4	Review exercise	Questions 1-24, p. 292
8.0	**Additional Topics in Trigonometry**	Chapter 20
8.1	Fundamental trigonometric identities	Questions 1-38, p. 509
8.2	Sine and cosine of the sum and difference of two angles	Questions 1-36, p. 514
8.3	Double angle fomnulae	Questions 1-30, p. 517'
8.4	Trigonometric equations	Questions 1-16, p. 526
8.5	Inverse trigonometric functions	Questions 1-32, p. 531
8.6	Review exercise	Questions 1-76, p. 533
9.0	**Exponential and Logarithmic Functions**	Chapter 13
9.1	The exponential and logarithmic functions	Questions 1-56, p. 352
9.2	Graphs of exponential and logarithmic functions	Questions 1-24, p. 355
9.3	Properties of iogarithms	Questions 1-48, p. 359
9.4	Logarlthms	Questions 1-24, p. 362
9.5	Natural logarithms	Questions 1-42, p. 365
9.6	Exponential and logarithmic equations	Questions 1-56, p. 375
		Questions 61-78
10.0	**Statistics and Empirica! Curve Fitting**	Chapter 21
10.1	Frequency distributions	Questions 1-24, p. 587
10.2	Measures of central tendency	Questions 1-32, p. 591
10.3	Standard deviation (omit Formula 22-2)	Questions 1-24, p. 597

V. REQUIRED RESOURCES / TEXTS / MATERIALS:

1. Basic Technical Mathematics with Calcuius, Washington A.J., Sixth Edition (metric version), Benjamin Cummings Publishers, 1995

2. Calculator: (Recommended) SHARP Scientific calcuiator EL-531G. *The use ofsome kinds of calculators may be æstricted during tests.*

VI. EVALUATION PROCESS / GRADING SYSTEM:

MAJOR ASSIGNMENTS AND TESTING
While regular tests will nomnally be scheduled and announced beforehand, there may be an unannounced test on cuaent work at any time. Such tests, at the discretion of the instructor, may be used for up to 30% of the overall mark.

At the discretion of the instructor, there may be a mid-term exam and there may be a final exam, each of which can contribute up to 30% of the overall mark.

VI.   EVALUATION PROCESS / GRADING SYSTEM (conrd):

The instnjctor will provide you with a list of test dates. Tests may be scheduled out of regular dass time.

ATTENDANCE
It is your responsibility to attend all classes during the semester. Research indicates there is a high correlation between attendance and student success.

!f you are absent from class, it is your responsibility to find out from your instnjctor what work was covered and assigned and to complete this work before the next ciass. Your absence indicates your acceptance of this responsibility.

Unexcused absence from a test may result in a mark of zero ("0"). Absence may be excused on compassionate grounds such as verified iilness or bereavement. On return from an excused absence, you should ask your instructorto schedule the writing of a make-up test. Failure to do so will be considered as an unexcused absence.

METHOD OF ASSESSMENT (GRADING METHOD)

A+	Consistently outstanding	(90% -100%)
A	Outstanding achievement	(80% - 89%)
B	Consistently above average achievement	(70% - 79%)
C	Satisfactory or acceptable achievement in all areas subject to assessment	(55% - 69%)
X or R	A temporary grade, limited to situations wlth extenuating circumstances, giving a student additionai time to complete course requirements **(See** Below)	(45% - 54%)
R	Repeat - The student has not achieved the objectives of the course, and the course must be repeated	(0% - 44%)
CR	Credit exemption	

The method of caiculating your weighted average wlli be defined by your instructor. Since grades are based upon averages, it foilows that good marks in some tests can compensate for a failing mark in another test.