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

COURSE OUTLINE

Course Titie: Mathematics

Code No.5 Mth 143-5 **Semesten Winter**

Program: Mechanical / Electrical / Electronics / Computer / Architectural / Civil Technician

Author: Mathematics Department

Date: January 1999 Previous Outline Dated: Jan. 1998

Approved: *youLa£ '%'i,\A^^^ J* *^Yl-n^/ /r*
Dean **Date**

Total Credits: 5 **Prerequisite(s): Mth 142**
Substltutes: Mth 220, Mth 221, Mth 426, Mth 251, Mth 612
Total Credit Hours: 64

I, COURSE DESCRIPTION:

This course is a continuation of MTH 142-5 (from Semester One) for engineering technology students. Topics of study include plane analytic geometry, geometry, complex numbers, and functions inciuding trigonometric, exponentia! and logarithmic functions. This course aiso Includes an introduction to statistics.

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 mathematlcat and critlcat thinking skills necessary to analyze and solve engineering technology problems.

II, LEARNtNG OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

A. Leaming Outcomes and Elements of the Performance:

Upon successful completion of this course, students will demonstrete the ability to:

Topid: Complex Numbers ***(Eiectricaf/Electronics Onfy)***
1. Write complex numbers in rectanguiar, polar, trigonometric and exponential fomns
2. Graph complex numbers in both rectangular and polar form
3. Find the sum, differences, products, quotients, powers and roots of complex numbers

Topic2: Geometry ***(CMIOnly)***
1. Solve practical problems to find the sides and angles of right triangles
2. Solve practk:at problems to find the areas of a triangla 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: Graphs of Trigonometric Functions
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

Topic4: Exponential and Logarithmic Functions
1. Define the logarithmic and exponential function
2. Graph logarithmic and exponential functions
3. Converl expressions between exponential and logarithmic fonn
4. Evaluate, manipulate and simplify logarithmic expressions
5. Solve exponential and logarithmic equations

TopicS; Variation
1. Review ratio and proportion
2. Study direct, inverse and joint variation

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

Topic6: Additional Topics in Trigonometry
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-angle fomnulae
4. Solve trigonometric equations
5. Evaluate Inverse trigonometric functions

Topic7: Plane Analytic Geometry
1. Write the equation of a line using the slope-intercept forni, the point-slope fonn or the two-point form
2. Write the equation of a circle, ellipse or parabola from given infomiation
3. Make a graph of any of the above conic sections

Topic 8: Statistics *(CMI Onfy)*
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

Topic 9: Basic Probability *(Electrtcal/Eiec^vntcs/Computer Oniy)*
1. Pemiutations and combinations
2. Rules of probability

n», TOPICS:

#	Topic	Approxlmate Time Frainne (no. of hours)
1or2	Complex numbers or Geometry	9
3	Graphs of Trigonometric Functions	5
4	Exponential and Logarithmic Functions	11
5	Variation	4
6	Additional Topics in Trigonometry	10
7	Plane Analytic Geometry	13
8 or 9	Statistics or Probability	12

IV. LEARNING ACTIVITIES:

1.0	**Complex Numbers**	Chapter 12
1.1	Basic definitions	Questions 1-52, p. 322
1.2	Basic operations with complex numbers	Questions 1-60, p. 325
1.3	Graphical representation of complex numbers	Questions 1-32, p. 327
1.4	Polar form of complex numbers	Questions 1-40, p. 330
1.5	Exponential form of a complex numbers	Questions 1-32, p. 333
1.6	Products, quotients, powers and roots of complex numbers	Questions 1-40, p. 339
1.7	Review exercrse	Questions 1-68, p. 347
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	Quadrilaterals	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	**Graphs of Trigonometric Functions**	Chapter 10
3.1	Graphs of y = Asinx and y = Acosx	Questions 1-20, p. 274
3.2	Graphs of y = Asinbx and y = Acosbx	Questions 1-20, p. 277
3.3	Graphs of y = Asin(bx+c) and y = Acos(bx+c)	Questions 1-24, p. 281
3.4	Review exercise	Questions 1-24, p. 292
4.0	**Exponential and Logarfthmic Functions**	Chapter 13
4.1	The exponential and logarithmic functions	Questions 1-56, p, 352
4.2	Graphs of exponential and logarithmic functions	Questions 1-24, p.355
4.3	Properties of logarithms	Questions 1-48, p. 359
4.4	Logaritiims	Questions 1-24, p. 362
4.5	Natural logarithms	Questions 1-42, p. 365
4.6	Exponential and logarithmic equations	Questions 1-56, p. 375
5.0	**Variation**	Chapter 18 & Instructor-supplied notes
5.1	Ratio and proportion	Questions 1-40, p. 473
5.2	Variation	Questions 1-48. p. 470
5.3	Review exercise	Questions 1-52, p. 480
6.0	**Addltional Topics In Trigonometry**	Chapter 20
6.1	Fundamental trigonometric identities	Questions 1-38, p. 509
6.2	Sine and cosine of the sum and difference of two angles	Questions 1-36, p. 514
6.3	Double angle fomnulae	Questions 1-30, p. 517
6.4	Trigonometric equations	Questions 1-16, p. 526
6.5	Inverse trigonometric functions	Questions 1-32, p.531
6.6	Review exercise	Questions 1-76, p. 533

IV. LEARNING ACTIVITIES (cont'd):

7.0	**Ptane Analytic Geometry**	Chapter21
7.1	Basic definitions	Questions 1-36, p.540
7.2	The straight line	Questions 1-40, p. 545
7.3	The circle	Questions 1-32, 551
7.4	The parabola	Questions 1-29, 555
7.5	The ellipse	Questions 1-31, 560
7.6	Translation of axes	Questions 1-28, 569
8.0	**Statistics and Empirical Curve Fitting**	Chapter21
8.1	Frequency distributlons	Questions 1-24, 587
8.2	Measures of central tendency	Questions 1-32, 591
8.3	Standard deviatlon (omit fonnula 22-2)	Questions 1-24, 597
8.4	Linear regression and goodness of fit (r^)	
9.0	**Basic Probability**	Instmctor supplied notes
9.1	Pennutations and combinations	
9.2	Addition ailes	
9.3	Multipiicatlon rules	

V. REQUIRED RESOURCES / TEXTS / MATERIALS:

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

2. Calculator: (Recommended) SHARP Scientific calculator EL-506L - Eiectrical, Computer and Electronics. *The use ofsome kinds of calcutators may be restricted during tests.*

VI. EVALUATION PROCESS / GRADING SYSTEM:

MAJOR ASSIGNMENTS AND TESTING

White regular tests will normally be scheduled and announced beforehand, there may be an unannounced test on current work at any time. Such tests, at the discretion of the instnjctor, may be used for up to 30% of the overall mark.

At the discretion of the instnjctor, 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 (confd):

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

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

If you are absent from dass, it is your responsibility to find out what work was covered and assigned and to complete this work before the next dass.

Unexcused absence from a test may resuit m a mark of zero ("0"). Absence may be excused on compassionate grounds such as verified illness or bereavement. On retum from an excused absence, you should ask your instmctor to Schedule the writing of a make-up test. Failure to do so *wW* 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 atl areas subject to assessment	(65% - 69%)
X or R	A temporary grade, limited to situations With extenuating drcumstances, giving a student additional 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%)
GR	Credit exemption	

The method of calculating your weighted average will be deflned by your instnjctor. Since grades are based upon averages, it foltows that good marks in some tests can compensate for a falling mark in another test.

V. EVALUATION PROCESS / GRADING SYSTEM (conf d):

Make-Up Test (if apptlcable)
An "X" grade may be assigned at the end of the regular semester if you have met ***ALL*** of the following criteria:

- an overall average between 45% and 54% was achieved
- at least 50% of the tests were passed
- at least 80% of the scheduled classes were attended
- alt of the topic tests were written

If you are assigned an "X" grade, you may convert it to a "C" grade by writing a make-up test on topics agreed to by the instnjctor. This test will be available at the time agreed to by your instructor.

At the end of the regular term, it Is your responslbtlity to obtain your results from you instructor and, in the event of an "X" grade, to inquire when Ihe make-up test will be available.

The score you receive on this make-up test will replace your original test score and be used to re-calculate your weighted average. If the re-calculated average is 55% or greater, a "C" grade will be assigned. If the re-calculated average is 55% or greater, a "C" grade will be assigned. If the re-calculated average is 54% or less, an "R" grade will be assigned.

"R" and "X" Grades at the end of the Semester
A student with a falling grade and poor attendance (less than 80% attendance) may be given an "R" at any time during the semester.

VI. SPECIAL NOTES:

Special Needs
Students with special needs (e.g. physical limltations, visual impairments, hearing impairments, leaming disabilities) are encouraged to discxiss required accommodations with the professor and/or contact the Special Needs Office.

Advanced Standino
Students who have completed an equivalent post-secondary course must bring relevant documents to the Coordinator, Mathematk^s Department:

- a copy of course outline
- a copy of the transcript verifying successful completion of the equivalent course

Note: A copy of the transcript must be on file in the Registrar's Office.

VII. PRIOR LEARNING ASSESSMENT

Students who have related employment-centered experience should see the Prior Leaming Assessment (PLA) Coordinator.