SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

SAULT
COLLEGE

COURSE OUTLINE

COURSE TITLE:	**Technical Mathematics II**		
CODE NO. :	**MTH143-5**	**SEMESTER:**	**Two**
PROGRAM:	**Engineering Technician and Technology Programs**		
AUTHOR:	**Mathematics Department**		
DATE:	**June 2012**	**PREVIOUS OUTLINE DATED:**	**JUNE 2011**
APPROVED:	"Brian Punch"		June/12
	CHAIR		**DATE**
TOTAL CREDITS:	**5**		
PREREQUISITE(S):	**MTH 142**		
HOURS/WEEK:	**4**		

I. COURSE DESCRIPTION:

This course is a continuation of MTH 142-5 (from Semester One) for engineering technology students. Topics of study include a more detailed view of exponents and radicals, plane analytic geometry, geometry, complex numbers, and functions including trigonometric, exponential and logarithmic functions. This course also 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 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:

Topic 1: Complex Numbers

1. Write complex numbers in rectangular, polar, trigonometric and exponential forms
2. Graph complex numbers in both rectangular and polar form
3. Find the sum, differences, products, quotients, powers and roots of complex numbers

Topic 2: 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

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

Topic 4: Exponential and Logarithmic Functions
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 5: Variation
1. Review ratio and proportion
2. Study direct, inverse and joint variation

Topic 6: 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 formulae or double-angle formulae
4. Solve trigonometric equations
5. Evaluate inverse trigonometric functions

Topic 7: Plane Analytic Geometry
1. Write the equation of a line using the slope-intercept form, the point-slope form or the two-point form
2. Write the equation of a circle, ellipse, parabola or hyperbola from given information
3. Make a graph of any of the above conic sections

Topic 8: Basic Statistics
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
4. Calculate the best fit curve (linear and non-linear regression)
5. Coefficient of correlation (r) – from class notes

III. TOPICS:

1. Complex numbers
2. Exponents and Radicals
3. Graphs of Trigonometric Functions
4. Exponential and Logarithmic Functions
5. Variation
6. Additional Topics in Trigonometry
7. Plane Analytic Geometry
8. Basic Statistics

III a. LEARNING ACTIVITIES:

TOPIC NUMBER	TOPIC DESCRIPTION	REFERENCE CHAPTER ASSIGNMENTS
1.0	**Complex numbers**	**Chapter 12**
1.1	Basic definitions	Questions 1-64, p. 336
1.2	Basic operations with complex numbers	Questions 1-62, p. 339
1.3	Graphical representation of complex numbers	Questions 1-40, p. 341
1.4	Polar form of complex numbers	Questions 1-44, p. 344
1.5	Exponential form of complex numbers	Questions 1-42, p. 346
1.6	Products, quotients, powers, and roots of complex numbers	Questions 1-58, p. 352
1.7	Review exercises	Questions 1-98, p. 360
2.0	**Exponents and Radicals**	**Chapter 11**
2.1	Simplifying expressions with integral exponents	Questions 1-70, p. 316
2.2	Fractional exponents	Questions 1-68, p. 320
2.3	Simplest radical form	Questions 1-72, p. 334
2.4	Addition and subtraction of radicals	Questions 1-52, p. 326
2.5	Multiplication and division of radicals	Questions 1-72, p. 329
2.6	Review Exercises	Questions 1-100, p. 331
3.0	**Graphs of Trigonometric Functions**	**Chapter 10**
3.1	Graphs of $y = a \sin x$ and $y = a \cos x$	Questions 1-40, p. 291
3.2	Graphs of $y = a \sin bx$ and $y = a \cos bx$	Questions 1-63, p 294
3.3	Graphs of $y = a \sin (bx + c)$ and $y = a \cos (bx + c)$	Questions 1-44, p. 298
3.4	Graphs of $y = \tan x$, $y = \cot x$, $y = \sec x$ and $y = \csc x$	Questions 1-30, p. 301
3.5	Review exercise	Questions 1-82, p. 309

4.0	**Exponential and Logarithmic Functions**	**Chapter 13**
4.1	Exponential functions	Questions 1-38, p. 364
4.2	Logarithmic functions	Questions 1-76, p. 368
4.3	Properties of logarithms	Questions 1-68, p. 373
4.4	Logarithms to Base 10	Questions 1-44, p. 376

4.5	Natural logarithms	Questions 1-56, p. 379
4.6	Exponential and logarithmic equations	Questions 1-60, p. 382
4.7	Review exercise	Questions 1-104, p. 388
5.0	**Variation**	**Chapter 18**
5.1	Ratio and proportion	Questions 1-48, p. 493
5.2	Variation	Questions 1-60, p. 498
5.3	Review exercise	Questions 1-76, p. 501
6.0	**Additional Topics in Trigonometry**	**Chapter 20**
6.1	Fundamental trigonometric identities	Questions 1-72, p. 531
6.2	The sum and difference formulas	Questions 1-52, p. 536
6.3	Double-angle formulas	Questions 1-60, p. 539
6.4	Half-angle formulas	Questions 1-44, p. 543
6.5	Solving trigonometric equations	Questions 1-60, p. 547

7.0	**Plane Analytic Geometry**	**Chapter 21**
7.1	Basic definitions	Questions 1-62, p. 562
7.2	The straight line	Questions 1-68, p. 567
7.3	The circle	Questions 1-62, p. 572
7.4	The parabola	Questions 1-58, p. 576
7.5	The ellipse	Questions 1-56, p. 582
7.6	The hyperbola	Questions 1-54, p. 587
8.0	**Basic Statistics**	**Chapter 22**
8.1	Frequency distributions	Questions 1-30, p. 616
8.2	Measures of central tendency	Questions 1-46, p. 620
8.3	Standard deviation	Questions 1-26, p. 625
8.4	Normal distribution	Questions 1-31, p. 630
8.5	Linear Regression including coefficient of correlation	Questions 1-18, p. 640 and hand out
8.6	Review exercise	Questions 1-60, p. 645

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

1. Basic Technical Mathematics with Calculus and MATHXL software (9^{th} Edition) Washington, SI Version, Addison-Wesley, Pearson, 2010
   ISBN: 9780132465623

2. **Calculator: (Recommended)**
   a) Electrical, Electronics, Computer Engineering – **SHARP Scientific Calculator EL-520L or equivalent, (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:

Tests overall worth of 70% toward the final grade.

Homework Assignments, In class Assignments, Quizzes overall worth of 30% toward the final grade.

Students must pass both the assigned work and the test portion of the course to pass the entire course.

There will likely be 4 to 5 tests during the semester and the dates will be identified in class. Each test will have the same worth and weight towards the final test portion of the score.
The professor reserves the right to adjust the number of tests, assignments and quizzes as warranted. Any modifications will be discussed in class. Students with special needs and/ or circumstances are required to identify their special needs with the professor.

Review the Special Notes section in this course outline for the professors' rights and students' responsibilities with respect to the evaluation of tests, final exam, assigned work and quizzes.

Attendance is mandatory and the quizzes, in class and assigned work will only be marked when completed in class.

It is the students' responsibility to notify the professor in advance of any absences and it will be at the professor's discretion to allow rewrites, retakes, modified assignments or quizzes where warranted.

Work is to be completed by the assigned dates and times. Failure to do so may result in zero grades for the assigned work.

Some of the assigned work may be provided and/or completed through the internet via either MathXL software or LMS.

The following semester grades will be assigned to students in postsecondary courses:

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.

VI. SPECIAL NOTES:

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

The professor reserves the right to adjust the number of tests, the final exam, assignments and quizzes as warranted. Any modifications will be discussed in class. Students with special needs and/ or circumstances are required to identify their special needs with the professor.

Attendance is mandatory and the quizzes, in class and assigned work will only be marked when completed in class.

It is the students' responsibility to notify the professor in advance of any absences and it will be at the professor's discretion to allow rewrites, retakes, modified assignments or quizzes where warranted.

Work is to be completed by the assigned dates and times. Failure to do so may result in zero grades for the assigned work.

Some of the assigned work may be provided and/or completed through the internet via either MathXL software or LMS.

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.

The professor reserves the right to use other tools and/or techniques that may be more applicable. These other tools/techniques for effective communication will be discussed, identified and presented throughout the delivery of course content.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.