



## COURSE OUTLINE: MTH145 - MATHEMATICS

Prepared: Mathematics Department

Approved: Bob Chapman, Chair, Health

<b>Course Code: Title</b>	MTH145: MATHEMATICS
<b>Program Number: Name</b>	4039: MECH. ENG. TN-MANUFA
<b>Department:</b>	MATHEMATICS
<b>Semesters/Terms:</b>	21F, 22W
<b>Course Description:</b>	By the end of this course, students will have demonstrated the ability to simplify, evaluate, and convert a variety of arithmetic and algebraic expressions and equations using arithmetic operations, algebraic properties, systems of measurement and dimensional analysis. Geometry, trigonometry, and vectors will be studied. Students will develop critical thinking and problem-solving skills through exposure to applied problems involving ratios, proportions, variation, trigonometry, geometry, and other program related topics involving linear functions.
<b>Total Credits:</b>	4
<b>Hours/Week:</b>	4
<b>Total Hours:</b>	60
<b>Prerequisites:</b>	There are no pre-requisites for this course.
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Substitutes:</b>	MTH142, MTH612, OEL806
<b>This course is a pre-requisite for:</b>	MTH146
<b>Essential Employability Skills (EES) addressed in this course:</b>	EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 10 Manage the use of time and other resources to complete projects.
<b>Course Evaluation:</b>	Passing Grade: 50%, D  A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
<b>Books and Required Resources:</b>	Basic Technical Mathematics with Calculus by Washington Publisher: Pearson Education Canada Edition: 11th ISBN: 9780134289915  Calculator - Sharp EL-520XTB (available in the bookstore)  Basic Technical Mathematics with Calculus, SI Version (Subscription) by Washington

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.



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**Course Outcomes and Learning Objectives:**

<b>Course Outcome 1</b>	<b>Learning Objectives for Course Outcome 1</b>
1. Algebraic Operations	1.1 Perform basic arithmetic operations on signed numbers and fractions. 1.2 Take powers, roots and reciprocals of signed numbers and algebraic quantities. 1.3 Evaluate multi-step mathematical expressions, including exponential and square root expressions, with numbers in their various forms: whole, integers, and rational numbers. 1.4 Convert numbers between ordinary, scientific, and engineering notations. 1.5 Simplify algebraic expressions using laws of exponents, addition, subtraction, division, and multiplication. 1.6 Solve linear equations and solve literal equations for the indicated variable. 1.7 Solve applications involving linear equations.
<b>Course Outcome 2</b>	<b>Learning Objectives for Course Outcome 2</b>
2. Units of Measurement and Approximate Numbers	2.1 Define and differentiate between accuracy and precision. 2.2 Perform arithmetic operations on approximate numbers and determine the appropriate number of significant digits or precision in answers. 2.3 Utilize the metric and US Customary systems of measurement. 2.4 Convert units of measurement within the metric system and between systems of measurement.
<b>Course Outcome 3</b>	<b>Learning Objectives for Course Outcome 3</b>
3. Ratios, Proportions and Variation	3.1 Solve application problems involving ratios and proportions. 3.2 Develop formulas and solve application problems involving direct, indirect and joint variation.
<b>Course Outcome 4</b>	<b>Learning Objectives for Course Outcome 4</b>
4. Triangle Trigonometry	4.1 Convert angles between decimal degrees, radians, degrees, minutes, seconds, and revolutions. 4.2 Find the trigonometric functions of angles in right triangles. 4.3 Find an angle given a trigonometric function. 4.4 Find the missing sides and angles of a right triangle. 4.5 Use special triangles to find exact trigonometric ratios. 4.6 Solve practical problems involving the right triangle.
<b>Course Outcome 5</b>	<b>Learning Objectives for Course Outcome 5</b>
5. Geometry	5.1 Calculate the distance between two points. 5.2 Calculate the slopes and inclinations of lines and describe the orientation of lines relative to each other based on the slopes. 5.3 Find the x-y intercepts of a line algebraically. 5.4 Determine the equation of a line given two points or a point and a slope.

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	<p>5.5 Graph lines given two points, a point and a slope, or the equation of a line.</p> <p>5.6 Define and find supplementary, complementary, adjacent, vertical, corresponding, alternate interior, and alternate exterior angles.</p> <p>5.7 Describe types of triangles, including similar and congruent, and find the perimeter and area of any triangle.</p> <p>5.8 Use Pythagorean Theorem as necessary to find missing sides of right triangles.</p> <p>5.9 Describe types and properties of quadrilaterals and find the perimeter and area of any quadrilateral.</p> <p>5.10 Describe the parts of a circle, including chord, secant, and tangent, and find the circumference, diameter, radius and area of circles.</p> <p>5.11 Find the surface area, lateral surface area, and volume of cylinders, cones, prisms, pyramids, and spheres.</p> <p>5.12 Solve practical problems involving 2 and 3-dimensional objects.</p>
<b>Course Outcome 6</b>	<b>Learning Objectives for Course Outcome 6</b>
Trigonometry and Vectors	<p>6.1 Identify the algebraic sign of a given trigonometric function for an angle in any quadrant.</p> <p>6.2 Identify reference angles and utilize them to determine angles in any quadrant.</p> <p>6.3 Find a trigonometric function for any angle using a calculator.</p> <p>6.4 Solve applied problems involving arc length and the area for a sector of a circle.</p> <p>6.5 Resolve a vector into its components.</p> <p>6.6 Determine the resultant of two or more vectors using the polygon method, the parallelogram method, and adding by components.</p> <p>6.7 Solve oblique triangles using the sine and cosine laws.</p> <p>6.8 Solve applied problems requiring oblique triangles.</p>
<b>Course Outcome 7</b>	<b>Learning Objectives for Course Outcome 7</b>
Systems of Linear Equations	7.1 Solve systems of two variable linear equations by graphing, substitution, and addition/subtraction methods.

**Evaluation Process and Grading System:**

Evaluation Type	Evaluation Weight
Tests	100%

**Date:** August 19, 2021

**Addendum:** Please refer to the course outline addendum on the Learning Management System for further information.

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