



## COURSE OUTLINE: MTH145 - MATHEMATICS

Prepared: Mathematics Department

Approved: Martha Irwin - Dean

<b>Course Code: Title</b>	MTH145: MATHEMATICS
<b>Program Number: Name</b>	4039: MECH. ENG. TN-MANUFA
<b>Department:</b>	MATHEMATICS
<b>Academic Year:</b>	2025-2026
<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, and 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>	56
<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>Other Course Evaluation &amp; Assessment Requirements:</b>	Smart watches, smart phones and similar devices are not allowed during tests or quizzes and must be removed. Smart phones are not acceptable for use as a calculator during an exam or quiz.
<b>Books and Required Resources:</b>	Calculator Sharp EL531



**Course Outcomes and Learning Objectives:**

<b>Course Outcome 1</b>	<b>Learning Objectives for Course Outcome 1</b>
1. Evaluate arithmetic expressions, simplify algebraic expressions, and solve linear equations.	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 Simplify algebraic expressions using laws of exponents, addition, subtraction, division, and multiplication. 1.5 Solve linear equations and solve literal equations for the indicated variable.
<b>Course Outcome 2</b>	<b>Learning Objectives for Course Outcome 2</b>
2. Convert between different number notations and different units of measurement and apply the rules for performing calculations with approximate numbers.	2.1 Convert numbers between ordinary, scientific, and engineering notations. 2.2 Define and differentiate between accuracy and precision. 2.3 Perform arithmetic operations on approximate numbers and determine the appropriate number of significant digits or precision in answers. 2.4 Utilize the metric and US Customary systems of measurement. 2.5 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. Apply concepts of ratios, proportions, and variation to simplify expressions and solve problems.	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. Convert between different angle measurements and apply trigonometric functions to right triangles.	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. Analyze geometric properties of lines, determine equations and graphs of linear relationships, classify angles and triangles, apply the Pythagorean Theorem, identify properties of quadrilaterals and circles, and solve problems involving the perimeter,	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. 5.5 Graph lines given two points, a point and a slope, or the equation of a line. 5.6 Define and find supplementary, complementary, adjacent, vertical, corresponding, alternate interior, and alternate exterior



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

<b>Evaluation Process and Grading System:</b>	<b>Evaluation Type</b>	<b>Evaluation Weight</b>
	Tests	100%

**Date:** August 1, 2025

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