Course Prefix and Number: <u>MTH 130</u>   **Credits:** <u>3</u>

Course Title: <u>Fundamentals of Reasoning</u>

Course Description:

Presents elementary concepts of algebra, linear graphing, financial literacy, descriptive statistics, and measurement and geometry. Based on college programs being supported by this course, colleges may opt to add additional topics such as logic or trigonometry. This course is intended for occupational/technical programs. Prerequisites: Competency in Introductory Algebra MDE 10 as demonstrated through placement or by satisfactorily completing MDE 10. Lecture 3 hours. Total 3 hours per week. 3 credits

General Course Purpose:

This course is intended for students who are in career and technical fields/degree programs requiring technical math components or contextualized learning and is organized around big mathematical concepts. The course's nontraditional treatment of content will help students develop conceptual understanding by supporting them in making connections between concepts and applying previously learned material to new contexts. The course will help to prepare students for success in future courses, gain skills for the workplace, and participate as productive citizens in our society.

Course Prerequisites and Co-requisites:

Prerequisites: Competency in Introductory Algebra MDE 10 as demonstrated through placement or by satisfactorily completing MDE 10.

Student Learning Outcomes:
Upon completing the course, the student will be able to

1. Demonstrate knowledge of basic algebra through application
   - Solve real world application problems requiring basic operations and simple linear equations;
   - Perform operations with signed numbers (including whole numbers, decimals, and fractions);
   - Simplify and evaluate algebraic expressions using the order of operations;
   - Solve simple linear equations - one step equations, two step equations and some multi-step equations requiring distributive property;
   - Determine the reasonableness of answers using estimation;

2. Apply linear graphing
   - Locate and plot points on the xy plane;
   - Interpret the concept of slope using real world examples (including vertical and horizontal lines);
   - Graph lines using a table of values with and without the domain provided;
   - Graph lines using the slope-intercept method when lines are in $y = mx + b$ form and $Ax + By = C$ form;

- Write the equation of a line in slope-intercept form that models a real world situation when given the rate of change and initial value;
- Make predictions using the equation of a line;
- Graph and solve a system of two linear equations in an applied context;

3. Demonstrate financial literacy using percents, ratios, and proportions
   - Create and simplify ratios;
   - Solve given proportions;
   - Solve real world problems using proportions;
   - Calculate percentages, sales tax, and discounts;
   - Create a budget to include percentages and a pie chart using appropriate software;
   - Calculate simple and compound interest;
   - Interpret credit scores and how they affect opportunities to buy on credit;
   - Solve problems which involve buying on credit, including add-on interest rate loans, and home buying;
   - Calculate FICA and federal income taxes (simple cases);

4. Demonstrate knowledge of descriptive statistics
   - Compute and interpret statistics (mean, median, mode, range, quartiles/percentiles) for data displayed in various formats, such as a boxplot, stem-and-leaf plots, frequency distributions, histogram, pie/line/bar graph;
   - Compare sets of data by comparing similarities and differences in their graphical displays and/or descriptive statistics;
   - Create graphical displays of data using spreadsheet software such as Excel;
   - Compute and interpret descriptive statistics for a set of real-world data, including mean, median, mode, range, standard deviation using spreadsheet software or a calculator;
   - Identify graphical displays or arguments that are misleading or involve the incorrect use of statistical concepts;

5. Solve problems by applying measurement and geometry topics in a variety of real world contexts;

6. Demonstrate knowledge of logic
   - Identify statements and form compound statements and negations using "and," "or," and "not";
   - Use truth tables to determine the truth value of compound statements and to determine whether statements are equivalent;
   - Identify conditional statements. Write and determine truth values for the converse, inverse, and contrapositive of a conditional statement;
   - Use truth tables to determine the validity of a syllogistic argument;
   - Draw and interpret Venn diagrams;
   - Distinguish between inductive and deductive reasoning;
   - Use inductive reasoning to find a pattern or to disprove a statement by finding a counter-example;

7. Demonstrate knowledge of trigonometry
   - Use terms related to an angle(s);
   - Define the trigonometric functions and their values;
   - Solve right triangles and their applications;
   - Interpret the signs of the trigonometric function of angles greater than 90º; and
   - Determine trigonometric functions of any angle.

Major Topics to Be Included:

- Basic Algebra through Application
- Linear Graphing Applied
- Financial Literacy using Percents, Ratios, and Proportions
- Descriptive Statistics
- Measurement and Geometry
- Logic (optional topic to support certain CTE programs)
- Trigonometry (optional topic to support certain CTE programs)

Effective Date/Updated: May 1, 2023