Mathematical Reasoning and Modeling

Mathematical Reasoning and Modeling is a terminal course in mathematics for students in the humanities. Given the variety of college and career paths falling within the humanities, this course may be customized to fit the student needs for a particular postsecondary institution. The proposed student learning outcomes/objectives form a basic course framework that will be enhanced by including additional outcomes/objectives, as needed.

The purpose of this course is to provide a comprehensive overview of the skills required to navigate the mathematical demands of modern life and prepare students for a deeper understanding of information presented in mathematical terms. Emphasis is placed on improving students' ability to draw conclusions, make decisions, and communicate effectively in mathematical situations that depend upon multiple factors. To that end, students will develop critical thinking and problem solving skills through the following student learning outcomes.

I. **Proportional Reasoning**
    Students will draw conclusions or make decisions using proportional reasoning. Specifically, students will be able to:
    - *Use ratios, proportions, rates, and percentages to explain, draw conclusions, or make decisions.*
    - *Use units and unit conversions to explain, draw conclusions, or make decisions.*
    Possible content topics: Ratios, proportions, rates, percentages, units, conversions, absolute and relative change, geometric proportions, etc.

II. **Statistical Reasoning**
    Students will read, interpret, analyze, and synthesize quantitative data (e.g., graphs, tables, statistics, survey data, etc.) and make reasoned estimates and inferences. Specifically, students will be able to:
    - *Collect and organize data in graphs and tables.*
    - *Use descriptive statistics to interpret and analyze quantitative data.*
    - *Use probability to interpret and analyze quantitative data.*
    - *Communicate statistical findings effectively.*
    Possible content topics: Probability, descriptive statistics, visual displays of quantitative information, correlation and causation, etc.

III. **Mathematical Modeling**
    Students will create, apply and use mathematical models to solve problems. Specifically, students will be able to:
    - *Describe and contrast linear rate and non-linear rate through verbalization and writing.*
    - *Create linear and non-linear functions from quantitative data and explain the results.*
    - *Interpret and analyze linear and non-linear functions that model data.*
    Possible content topics: Linear functions, exponential functions, scatterplots and best fit lines, financial math, etc.

IV. **Additional Topics as Determined by Individual Institutions**