

Cape Cod Community College

Departmental Syllabus

Prepared by the Department of Mathematics

Date of Departmental Approval: December 4, 2017

Date approved by Curriculum and Programs: January 24, 2018

Effective: Fall 2018

1. Course Number: MAT130

Course Title: Quantitative Reasoning

2. Description: This course explores connections between mathematics and various aspects of modern life. Topics in this course include logic, unit analysis, percentages, personal finance, statistics, probability, linear and exponential growth, mathematical modeling, and geometry. (4 contact hours)

3. Student Learning Outcomes (instructional objectives, intellectual skills):

Upon successful completion of this course, students are able to do the following.

- Describe the nature and history of mathematics, its role in scientific inquiry, and its importance for comprehending issues in the public sphere.
- Analyze evidence, use arguments, question assumptions, detect fallacies, evaluate statistical claims, and assess risks using probabilistic method.
- Demonstrate estimation skills, numeracy, and accuracy when working with percentages, ratios, and decimals.
- Apply mathematical models as well as basic statistical techniques to analyze real world data algebraically, numerically, and graphically, using technology where appropriate.
- Recognize misleading use of statistics and media graphics.
- Communicate the results of quantitative analysis or solutions to mathematical problems in written, oral, and visual form.
- Explain how the mathematics of income taxes, student loans, credit cards, and mortgages can be used to make decisions and solve problems in an individual's personal and professional life.

4. Credits: 3 credits

5. Satisfies General Education Requirement: Mathematics & Quantitative Reasoning

6. Prerequisite(s): MAT035 (Algebra for Non-STEM) or MAT045 (Intermediate Algebra for STEM) or satisfactory basic skills assessment score

7. Semesters Offered: Fall, Spring

8. Suggested General Guidelines for Evaluation: Comprehensive final examination, hour tests, homework problems, projects, quizzes, and papers

9. General Topical Outline (Optional):

I. Logic

- A. Sets, Venn diagrams, and symbolic logic
- B. Truth tables
- C. Inductive and deductive reasoning

II. Number, Ratio, and Proportional Reasoning

- A. Unit conversion
- B. Uses and misuses of percentages.
- C. Growth and decay using absolute and relative change
- D. Comparisons using absolute and relative difference
- E. Scientific notation
- F. Index numbers
- G. Inflation
- H. Order of magnitude estimates
- I. Proportional reasoning, including scale factors

III. Financial Mathematics

- A. Budgeting
 - B. Simple interest
 - C. Compound interest
 - D. Savings plans and investments
 - E. Loan payments, credits cards, and mortgages
 - F. Income taxes
 - G. Debts and deficits
 - H. Federal budget
- IV. Statistics
- A. Data collection methods
 - B. Sources of bias and error in statistical studies
 - C. Visual displays of data
 - D. Correlation
 - E. Center, shape and spread of a data set
- V. Probability
- A. Empirical, theoretical, and subjective probabilities
 - B. Data displays and models to determine probabilities (e.g. two-way tables, tree diagrams)
 - C. False negatives/positives
- VI. Modeling
- A. Linear models
 - B. Exponential models
 - C. Doubling time and half-life
- VII. Geometry
- A. Perimeter, area, and volume of two- and three-dimensional objects
- VIII. Mathematics and the Arts
- A. Mathematics and music
 - B. Perspective and symmetry
 - C. Proportion and the Golden Ratio