

MAT 115
MATHEMATICAL MODELS

COURSE DESCRIPTION:

Prerequisites: MAT 070 or satisfactory score on placement test

Corequisites: None

This course develops the ability to utilize mathematical skills and technology to solve problems at a level found in non-mathematics-intensive programs. Topics include applications to percent, ratio and proportion, formulas, statistics, functional notation, linear functions and their graphs, probability, sampling techniques, scatter plots, and modeling. Upon completion, students should be able to solve practical problems; reason and communicate with mathematics; and work confidently, collaboratively, and independently. Applications may be drawn from, but are not limited to, the fields of business, public services, and various technologies. Course Hours Per Week: Class, 2. Lab, 2. Semester Hours Credit, 3.

LEARNING OUTCOMES:

1. Students will be able to use algebraic techniques to solve problems involving linear functions, ratios and proportions, and conversions between systems of measurement. Students will display proficiency by demonstrating the following competencies:
 - a. Solve linear equations.
 - b. Use linear equations to solve application problems.
 - c. Calculate ratios, solve proportions, and solve applied problems using proportions and variation.
 - d. Use function notation.
 - e. Graph linear functions.
 - f. Find the slope of a line.
 - g. Convert measurement numbers within the English and metric systems and between the two systems.

2. Students will be able to solve practical problems involving consumer mathematics and financial management. Students will display proficiency by demonstrating the following competencies:
 - a. Solve applied problems involving percent.
 - b. Compute simple interest and compound interest.
 - c. Compute present value.
 - d. Find the amount of an annuity and the present value of an annuity.
 - e. Determine the payment into a sinking fund.
 - f. Calculate consumer credit finance charges on credit cards and installment purchases.
 - g. Calculate the annual percentage rate and compute the early payoff for a loan.
 - h. Prepare an amortization schedule for a mortgage loan.

3. Students will be able to apply concepts of probability and statistics to solve practical problems. Students will display proficiency by demonstrating the following competencies:
 - a. Solve counting problems by using tree diagrams, the fundamental counting principle, permutations, and combinations.
 - b. Solve probability problems by using the definition and by counting techniques.
 - c. Read and construct statistical graphs.
 - d. Find the mean, median and mode for sample data.
 - e. Compute the range and standard deviation for sample data.
 - f. Use the normal curve to interpret information about normally distributed data.
 - g. Use scatter plots to determine correlation and make predictions.

OUTLINE OF INSTRUCTION:

- I. Algebra: equations
 - A. Solving linear equations
 - B. Applications of linear equations
 - C. Ratio, proportion, and variation
- II. Algebra: graphs and functions
 - A. Function notation
 - B. Linear functions and their graphs
- III. Consumer mathematics and financial management
 - A. Percent
 - B. Interest
 - C. Present value
 - D. Annuities
 - E. Present value of an annuity
 - F. Sinking funds
 - G. Installment buying
 - H. The cost of home ownership
- IV. Measurement
 - A. Measuring length: the metric system
 - B. Measuring area and volume
 - C. Measuring weight and temperature
- V. Counting methods and probability theory
 - A. The fundamental counting principle
 - B. Permutations
 - C. Combinations
 - D. Fundamentals of probability
 - E. Probability with the fundamental counting principle, permutations, and combinations

- VI. Statistics
 - A. Sampling, frequency distributions, and graphs
 - B. Measures of central tendency
 - C. Measures of dispersion
 - D. The normal distribution
 - E. Scatter plots, correlation, and regression lines

REQUIRED TEXTBOOK AND MATERIALS:

Blitzer, Robert. Thinking Mathematically. 4th Edition. Prentice Hall, 2008.

Personal Finance Module

Scientific calculator

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.