

**MAT 122**  
**ALGEBRA/TRIGONOMETRY II**

**COURSE DESCRIPTION:**

Prerequisites: MAT 121 or satisfactory score on placement test

Corequisites: None

This course extends the concepts covered in MAT 121 to include additional topics in algebra, function analysis, and trigonometry. Topics include exponential and logarithmic functions, translation and scaling of functions, Sine Law, Cosine Law, vectors, and statistics. Upon completion, students should be able to demonstrate an understanding of the use of technology to solve problems and to analyze and communicate results. Course Hours Per Week: Class, 2. Lab, 2. Semester Hours Credit, 3.

**LEARNING OUTCOMES:**

1. Students will be able to use techniques of algebra and algebraic formulas to simplify expressions and to manipulate and solve equations. Students will display proficiency by demonstrating the following competencies:
  - a. Solve applied problems using ratio and proportion.
  - b. Solve variation problems.
  - c. Apply complex numbers to alternating-current circuits.
  - d. Convert expressions between exponential and logarithmic form.
  - e. Graph exponential and logarithmic functions.
  - f. Use the properties of logarithms.
  - g. Solve exponential and logarithmic equations.
  
2. Students will be able to define, identify, and graph angles, vectors, and trigonometric functions and their properties, and use trigonometry to solve practical problems both analytically and with the use of technology. Students will display proficiency by demonstrating the following competencies:
  - a. Find the trigonometric functions of any angle.
  - b. Use radian measure to measure angles.
  - c. Solve application problems using radian measure.
  - d. Sketch graphs of the six standard trigonometric functions and those graphs with changes in amplitude, period and phase shift.
  - e. Construct composite trigonometric curves.
  - f. Define and evaluate inverse trigonometric functions.
  - g. Define vectors and compute horizontal and vertical components of vectors.
  - h. Add vectors using components.
  - i. Use vectors to solve application problems.

- j. Solve triangles using the Law of Sines and the Law of Cosines.
3. Students will be able to use descriptive statistics to summarize data and make predictions using linear models. Students will display proficiency by demonstrating the following competencies:
- a. Find the standard deviation for a set of data.
  - b. Fit a straight line by the least squares method.

### **OUTLINE OF INSTRUCTION:**

#### I. Variation

- A. Ratio and proportion
- B. Variation

#### II. Trigonometric Functions of any angle

- A. Signs of the trigonometric functions
- B. Trigonometric functions of any angle
- C. Radians
- D. Applications of radian measure

#### III. Graphs of the trigonometric functions

- A. Graphs of  $y = a \sin x$  and  $y = a \cos x$
- B. Graphs of  $y = a \sin bx$  and  $y = a \cos bx$
- C. Graphs of  $y = a \sin (bx+c)$  and  $y = a \cos (bx+c)$
- D. Graphs of  $y = \tan x$ ,  $y = \cot x$ ,  $y = \sec x$  and  $y = \csc x$
- E. Applications of the trigonometric graphs
- F. Composite trigonometric curves
- G. The inverse trigonometric functions

#### IV. Vectors and oblique triangles

- A. Introduction to vectors
- B. Components of vectors
- C. Vector addition by components
- D. Applications of vectors
- E. Oblique triangles, the Law of Sines
- F. The Law of Cosines

#### V. Complex numbers

- A. An application to alternating-current circuits

#### VI. Exponential and logarithmic functions

- A. Graphs of  $y = b^x$  and  $y = \log_b x$

- B. Properties of logarithms
- C. Logarithms to the base 10
- D. Natural logarithms
- E. Exponential and logarithmic equations

VII. Introduction to statistics

- A. Frequency distributions
- B. Measures of central tendency
- C. Standard deviation
- D. Linear regression

**REQUIRED TEXTBOOK AND MATERIALS:**

Washington, Allyn J., Basic Technical Mathematics, 9th edition, Pearson Education, 2009.

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.