MATH 47: PATH TO CALCULUS

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2025
Units:	6
Hours:	6 lecture per week (72 total per quarter)
Prerequisite:	Intermediate Algebra or equivalent.
Advisory:	Some sections are offered with extra support and require concurrent enrollment in MATH 247 or NCBS 447.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area 2: Mathematical Concepts & Quantitative Reasoning
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- Students will be able to solve problems involving applications of algebraic and transcendental functions
- Students will develop a conceptual understanding of algebraic and transcendental functions
- Students will demonstrate an ability to solve equations and inequalities
- Students will assess their own learning process and performance in preparation for calculus

Description

This course is intended for students who want to prepare for success in calculus. Topics include a study of functions, function families, their properties and transformations, compositions and inverses. Function families include trigonometric, logarithmic, exponential, polynomial, and rational. Multiple representations of functions are emphasized.

Course Objectives

The student will be able to:

1. Read and understand a mathematics textbook.
2. Graph, analyze, and transform polynomial, rational, exponential, logarithmic, and trigonometric functions, and solve and apply related equations and inequalities.
3. Recognize the relationship between functions and their inverses graphically and algebraically.
4. Solve application problems using polynomial, rational, exponential, logarithmic, and trigonometric functions, and model real world applications.
5. Explore circles and angles.
6. Evaluate and simplify trigonometric expressions using identities.
7. Solve right and oblique triangles.
8. Use technology, such as graphing calculators and/or computer software, to assist in solving problems involving any of the topics in (2) through (7) above.
9. Discuss mathematical problems and write solutions in accurate mathematical language and notation.
10. Interpret mathematical solutions.

Course Content

1. Read and understand a mathematics textbook
    a. Explain mathematical concepts in mathematical language
    b. Explain mathematical concepts in familiar language
    c. Translate mathematical definitions into familiar language
    d. Translate mathematical notation into familiar language
    e. Explain the connections between mathematical concepts
2. Graph, analyze, and transform polynomial, rational, exponential, logarithmic, and trigonometric functions, and solve and apply related equations and inequalities
    a. Recognize each function type
    b. Explore the behavior of graphs
        i. Perform a sign analysis
        ii. End behavior
        iii. Asymptotes
        iv. Increasing and decreasing
        v. Local extrema
    c. Find domain and range
    d. Solve equations and inequalities
3. Recognize the relationship between functions and their inverses graphically and algebraically
    a. Determine whether or not a function has an inverse function
    b. Properties of inverse functions
    c. Notation
4. Solve application problems using polynomial, rational, exponential, logarithmic, and trigonometric functions, and model real world applications
    a. Investigate applications involving functions, such as:
        i. Compound interest
        ii. Exponential population models
        iii. Radioactive decay
        iv. Newton's law of cooling
        v. Interpret amplitude, period, frequency, and shifts within the context of a trigonometric model
5. Explore circles and angles
    a. Convert between degrees and radians
    b. Arc length
    c. The unit circle
    d. Define sine, cosine, tangent, cotangent, cosecant, and secant functions
    e. Evaluate sine, cosine, tangent, cotangent, cosecant, and secant functions at a given angle
6. Evaluate and simplify trigonometric expressions using identities
    a. Pythagorean identity
    b. Odd and even identities
    c. Reciprocal identities
    d. Double angle identities
7. Solve right and oblique triangles

   a. Describe the six trigonometric functions using right triangles
   b. Use the appropriate trigonometric ratio to solve right triangles
   c. Apply the formulas for the Law of Sines and Law of Cosines
8. Use technology, such as graphing calculators and/or computer software, to assist in solving problems involving any of the topics in (2) through (7) above
   a. Calculator/computer utilities for evaluating problems involving optimization
   b. Calculator/computer utilities for finding zeros or roots of functions
9. Discuss mathematical problems and write solutions in accurate mathematical language and notation
   a. Application problems from other disciplines
   b. Proper notation
10. Interpret mathematical solutions
   a. Explain the significance of solutions to application problems

Lab Content

Not applicable.

Special Facilities and/or Equipment

1. Access to graphing technology, such as a graphing calculator or graphing software
2. When taught online or hybrid:
a. Internet access
b. Course management system
c. Specific software related to the course

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Written homework
Quizzes and tests
Proctored comprehensive final examination

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture
Discussion
Cooperative learning exercises

Representative Text(s) and Other Materials

Boelkins, Matthew. Active Prelude to Calculus. 2019.

Abramsom, Jay. Precalculus, 2nd ed. (Openstax). 2024.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Homework problems covering subject matter from text and related material ranging from 20-40 problems per week. Students will need to employ critical thinking in order to complete assignments.
2. Six hours per week of lecture covering subject matter from text and related material. Reading and study of the textbook, related materials, and notes.
3. Student activities covering subject matter from textbook and related materials. Activities will require students to discuss mathematical problems, write solutions in accurate mathematical language and notation, and interpret mathematical solutions.
4. Worksheets: Problems and activities covering the subject matter. Such problems and activities will require students to think critically. Such worksheets may be completed inside and/or outside of class.

Discipline(s)

Mathematics