

# MATH 48B: PRECALCULUS II

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	5
Hours:	5 lecture per week (60 total per quarter)
Prerequisite:	MATH 48A or equivalent.
Advisory:	Demonstrated proficiency in English by placement via multiple measures OR through an equivalent placement process OR completion of ESLL 125 & ESLL 249; UC credit for MATH 48A, 48B and 48C is limited to a maximum of 7.5 units for the combination or any portion of the series completed.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area V: Communication & Analytical Thinking
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

## Student Learning Outcomes

- Students will model, solve, and interpret applications using polynomial, rational, exponential, and logarithmic functions.
- Students will develop conceptual understanding of polynomial, rational, exponential, and logarithmic. They will demonstrate and communicate this understanding by graphing, analyzing, and transforming these functions and connecting their multiple representations.
- Students will solve polynomial, rational, exponential, and logarithmic equations.

## Description

This course is a continuation of topics from MATH 48A. Topics include polynomial, rational, exponential and logarithmic functions, transformations of these functions and their use in solving application problems.

## Course Objectives

The student will be able to:

- Graph, analyze and transform polynomial functions and solve and apply related equations and inequalities.
- Graph, analyze and transform rational functions and solve and apply related equations and inequalities.
- Graph, analyze and transform exponential functions and solve and apply related equations and inequalities.
- Recognize the relationship between functions and their inverses graphically and algebraically.
- Graph, analyze and transform logarithmic functions and solve and apply related equations and inequalities.

- Solve application problems using exponential, logarithmic, polynomial and rational functions and model real world applications.
- Use technology, such as graphing calculators and/or computer software to assist in solving problems involving any of the topics in (1) through (6) above.
- Discuss mathematical problems and write solutions in accurate mathematical language and notation.
- Interpret mathematical solutions.

## Course Content

- Graph, analyze and transform polynomial functions and solve and apply related equations and inequalities
  - Understand the definition of a polynomial function
  - Evaluate a polynomial function at a given value
  - Find the domain and range of a polynomial function
  - Explore the end behavior of graphs of polynomial functions
  - Explore the graphs of polynomial functions using the relationship between zeros and factors
  - Identify relative extrema of polynomial functions
- Investigate the Fundamental Theorem of Algebra
  - Characterization of real and complex zeros of polynomials
  - Recognize the potential difference between zeros and horizontal intercepts
- Solve equations and inequalities involving polynomial functions
- Investigate applications of higher order polynomial functions
- Graph, analyze and transform rational functions and solve and apply related equations and inequalities
  - Understand the definition of a rational function
  - Evaluate a rational function at a given value
  - Examine vertical, horizontal asymptotes and removable discontinuities
  - Find limits of and at infinity
  - Find the domain and range of rational functions
  - Graph functions that contain vertical and horizontal asymptotes
  - Solve equations and inequalities involving rational expressions
  - Investigate applications involving rational functions
  - Interpret the meaning of asymptotes in real-world applications
- Graph, analyze and transform exponential functions and solve and apply related equations and inequalities
  - Understand the definition of an exponential function
  - Evaluate an exponential function at a given value
  - Find the domain and range of an exponential function
  - Calculate change factors from tables and graphs
  - Calculate percentage rates of change from tables, graphs and change factors
  - Recognize the difference between functions with a constant percentage change and functions with a constant difference change
  - Construct exponential models algebraically from tables, graphs or words
  - Use exponential models to predict and interpret results
  - Graph exponential functions given in equations, tables or words
  - Examine applications involving half-life and double time
  - Investigate the relationship between growth factors and graphs of exponential functions

- xii. Investigate exponential growth and decay problems
- xiii. Investigate the number  $e$
- xiv. Solve equations and inequalities involving exponential functions
- xv. Investigate applications involving exponential functions, such as:
  1. Compound interest
  2. Exponential population models
  3. Radioactive decay
  4. Newton's law of cooling
- d. Recognize the relationship between functions and their inverses graphically and algebraically
  - i. Find the inverse of exponential and logarithmic functions
  - ii. Recognize the relationship between exponential and logarithmic functions, including domain and range
  - iii. Find the inverse of a rational function
- e. Graph, analyze and transform logarithmic functions and solve and apply related equations and inequalities
  - i. Understand the definition of a logarithmic function
  - ii. Evaluate a logarithmic function at a given value
  - iii. Find the domain and range of a logarithmic function
  - iv. Graph logarithmic and exponential functions from equations and tables
  - v. State and use properties of logarithms
  - vi. Identify common and natural logarithms
  - vii. Solve exponential equations using logarithms and interpret the real-world meaning of the results
  - viii. Solve logarithmic equations and interpret the real-world meaning of the results
  - ix. Investigate applications involving logarithms, such as:
    1. pH
    2. Intensity of sound
    3. Intensity of earthquakes
- f. Solve application problems using exponential, logarithmic, polynomial and rational functions and model real world applications
  - i. Create an appropriate model from a verbal description or graph
  - ii. Use the chosen model to solve application problems
  - iii. Interpret solutions
- g. Use technology, such as graphing calculators and/or computer software to assist in solving problems involving any of the topics in (1) through (6) above
  - i. Calculator/computer utilities for evaluating problems involving optimization
  - ii. Calculator/computer utilities for finding intersection points for graphs of two functions
  - iii. Calculator/computer utilities for finding zeros or roots of functions
- h. Discuss mathematical problems and write solutions in accurate mathematical language and notation
  - i. Application problems from other disciplines
  - ii. Proper notation
- i. Interpret mathematical solutions
  - i. 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 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:

Homework  
 Quizzes  
 Exams  
 Proctored comprehensive final exam

## 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

Stewart, Redlin, and Watson. [Precalculus: Mathematics for Calculus with Corequisite Support, 7th ed.](#) 2020.

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

- a. Homework problems covering subject matter from text and related material ranging from 30-60 problems per week. Students will need to employ critical thinking in order to complete assignments.
- b. Five hours per week of lecture covering subject matter from text and related material. Reading and study of the textbook, related materials and notes.
- c. Student projects covering subject matter from textbook and related materials. Projects will require students to discuss mathematical problems, write solutions in accurate mathematical language and notation and interpret mathematical solutions. Projects may require the use of a computer algebra system such as Mathematica or MATLAB.
- d. 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