

City Colleges of Chicago
Course Title: Precalculus

Length of course: 16 Weeks

Contact Hours: 6 Contact Hours

Credit Hours: 6 Credit Hours

Lecture Hours: 6 Lecture Hours

Lab Hours:

Weekly Plan: 6 Hours

Catalogue Description:

Pre-calculus emphasizes the notion of a function as a unifying concept for the topics of college algebra and an extension of the topics of trigonometry. The following families of functions and their characteristics are examined within this course: polynomial functions; rational functions; exponential and logarithmic functions; and trigonometric functions. Writing assignments, as appropriate to the discipline, are part of the course. **Applications involving problem-solving skills will be emphasized throughout the course.**

Students the Course is Expected to Serve:

This course is intended for students who plan to major in mathematics, engineering, or science.

Pre-requisites:

Prerequisite -- MATH 099 With a minimum grade of 'C' or Placement Test -- or Consent of Chair --

Course Objectives:

1. Analyze the graphs of various families of functions.
2. Apply the models and characteristics of various families of functions to scenarios in order to solve real-world problems.
3. Demonstrate an understanding of trigonometric functions and their behaviors.

Student Learning Outcomes:

Upon satisfactory completion of the course, students will be able to:

- A. **Polynomial Functions:** Identify the characteristics of a quadratic function (i.e., vertex, axis of symmetry, and direction of concavity).
- B. Compute roots/zeroes of a polynomial function by factoring techniques.
- C. Estimate the roots/zeroes of a polynomial function using graphs.
- D. **Rational Functions:** Simplify rational expressions using the division algorithm.
- E. Identify points of discontinuity of a rational function.
- F. Identify vertical/horizontal asymptotes and end behavior of rational functions.
- G. **Exponential and Logarithmic Functions:** Define exponential and logarithmic functions.
- H. Simplify exponential and logarithmic expressions using their properties.
- I. Solve exponential and logarithmic equations.
- J. Formulate and apply exponential and logarithmic functions to a contextual situation.
- K. **Trigonometric Functions:** Define the sine, cosine, tangent, and secant functions and their inverses, including the unit circle definition of these functions.
- L. Solve trigonometric equations.
- M. Apply right-angle trigonometry to a scenario.

- N. Verify trigonometric identities.
- O. Identify a trigonometric function from its graph.
- P. Graph a trigonometric function using its properties (e.g., periodicity, amplitude, phase shifts, etc.).
- Q. Apply trigonometric functions to basic concepts of physics (e.g., velocity, pendulum movement, basic current).
- R. *(It is expected that the following student learning outcomes (Characteristics of Functions) will be embedded as appropriate in the study of the family of functions listed above.)* Identify the domain and range of a function.
- S. Determine intervals on which functions are decreasing/increasing, continuous/non-continuous, or piecewise.
- T. Identify functions from multiple sources of information (i.e., verbal descriptions, graphs, equations, and tables of values).
- U. Relate the effect of transformations (i.e., translations, rescaling, or reflections) on graphs of functions and their corresponding equations.
- V. Perform operations (i.e., addition, subtraction, multiplication and division) on functions, including the composition of functions.
- W. Decompose a function into a composition of two or more functions.
- X. Formulate and apply a function to a contextual situation.
- Y. Determine the conditions under which a function has an inverse.
- Z. Identify the inverse of a function from multiple representations.
- AA. Reformulate a given function into various representations (i.e., verbal, graphical, algebraic, or tabular).

Topical Outline:

<u>Week</u>	<u>Course content and Exams</u>
1 - 4	The Concept of a Function (Review) Polynomial Functions Exam #1
5 - 8	Rational Functions Exam #2
9 - 12	Exponential and Logarithmic Functions Exam #3
13 - 16	Trigonometric Functions Final Exam

Calendar:

Methods of Evaluation:

Total Percentage: 0%

The weight given to exams, quizzes, and other instruments used for evaluation will be determined by the instructor.

Methods of Assessment:

Exams, quizzes, homework and other assessments will be used as appropriate to measure student learning.

Methods of Instruction:

G - Groupwork

L - Lecture

D - Discussion/Lecture

Problem-based activities, collaborative-learning techniques, and lecture will be used as appropriate.

Recommended Text:

1. Gary K. Rockswold *Precalculus with Modeling and Visualization* 3rd Edition, Addison-Wesley, 2005 ISBN: 9780321279071
2. Demana, Waits, Foley & Kennedy *Precalculus: Graphical, Numerical, Algebraic* 7th Edition, Addison-Wesley, 2006 ISBN: 9780321356932