MATH A170: PRECALCULUS

Item	Value
Curriculum Committee Approval Date	05/03/2023
Top Code	170100 - Mathematics, General
Units	5 Total Units
Hours	90 Total Hours (Lecture Hours 90)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Associate Arts Local General Education (GE)	• OC Comm/Analytical Thinking - AA (OA2)
Associate Science Local General Education (GE)	• OCC Comm/AnalyticalThinking-AS (OAS2) • OCC Mathematics (OMTH)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 2A Math Concepts (2A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 2A Math Concepts (2A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course Description

The course includes structure and properties of number systems; applications, solution and graphs of polynomials, rational, exponential, logarithmic and trigonometric functions; matrices; sequences and series; analytic geometry. Prepares students for MATH A180. PREREQUISITE: MATH A070, MATH A120, or appropriate placement. Transfer Credit: CSU; UC: Credit Limitation: MATH A115 and MATH A170 combined: maximum credit, 5 semester/7.5 quarter units.

Course Level Student Learning Outcome(s)

1. Graph polynomial and rational functions by hand.
2. Obtain and simplify the difference quotient for a given function.
3. Solve trigonometric equations.

Course Objectives

- 1. Graph a linear function, including intercepts and slope.
- 2. Graph a quadratic function and complete the square to find its vertex.
- 3. Factor and graph polynomials using the quadratic formula or division.
- 4. Solve and apply equations including absolute value and radical expressions.
- 5. Solve linear absolute value inequalities and quadratic inequalities possibly including absolute value.
- 6. Graph rational functions including asymptotes.
- 7. Recognize the relationship between functions and their inverses graphically and algebraically.
- 8. Graph exponential and logarithmic functions.
- 9. Solve exponential and logarithmic equations.
- 10. Identify special triangles and their related angle and side measures.
- 11. Define, use, and graph trigonometric and inverse trigonometric functions.
- 12. Apply changes in amplitude to generate new trigonometric graphs.
- 13. Evaluate the trigonometric function of an angle given in degree and radian measure.
- 14. Manipulate and simplify a trigonometric expression.
- 15. Solve triangles using right triangle trigonometry including the law of sines or the law of cosines.
- 16. Verify trigonometric identities.
- 17. Solve trigonometric equations.
- 18. Perform vector operations in rectangular and trigonometric form.
- 19. Solve systems of linear equations.
- 20. Solve systems of inequalities.
- 21. Use the binomial theorem.
- 22. Perform algebra involving summation notation.
- 23. Find nth terms and finite and infinite sums of arithmetic and geometric sequences.
- 24. Graph conic sections in standard position and using translation.
- 25. Graph polar and parametric functions.
- 26. Translate applications into mathematical expressions and solve.
- 27. Apply functions to model real world applications.

Lecture Content

It is imperative that instructors cover all topics in the outline in order to prepare the students for Math A180. Some topics are listed as optional. These topics are not part of the core material for the course and should be presented only if time permits and should not be discussed at the expense of a core topic. Applications should be included and discussed whenever possible. The math department encourages the instructor to incorporate the graphing calculator wherever it is appropriate. Brief Review of Algebra Simple equations Linear and absolute value inequalities Algebraic expressions Complex numbers Functions Definition of a function Domain and range Evaluation of functions Review basic graphing techniques and operations of linear and quadratic functions Radical and absolute value functions Operations and properties Algebra of functions Graphical transformations of absolute value, radical, and rational functions Solving equations containing radical and absolute value functions Inverse functions Polynomial Functions of Degree Greater than Two Theory of functions, including the Division Algorithm, Remainder Theorem, Factor Theorem, Fundamental Theorem of Algebra, and the Complete Factorization Theorem Analysis of real and imaginary zeros for a polynomial function Graphs of polynomial functions of higher degree Rational Functions Analysis and graphs of rational functions, including horizontal, vertical, and slant asymptotes Logarithmic and Exponential Functions Definitions and properties Graphs of logarithmic and exponential functions Graphical transformations of logarithmic and exponential functions Solving equa tions containing logarithmic or exponential expressions Trigonometric Functions Review of angle measurement, right angle trigonometry Unit circle and definition

of trig functions of real numbers Graphs of sine, cosine, and tangent functions with amplitude changes, period changes, phase shifts, and vertical shifts Basic graphs of secant, cosecant, and cotangent functions with amplitude changes and without period changes, phase shifts, and vertical shifts Trigonometric identifies, including sum and difference, double-angle, and half-angle formulas Application of Trig Functions Solving equations containing trig functions Right triangle trig applications Oblique triangle applications using the law of sines and the law of cosines Vectors, vector operations, and the dot product of vectors Polar coordinates and graphs of polar functions Systems of Equations and Inequalities Solving systems of equations in at least 3 variables Non-linear systems of equations Systems of inequalities Partial fractions decompositions Conic Sections Definition, analysis and graphs of circles, parabolas, ellipses, and hyperbolas in Cartesian form Graphs of parametric equations Sequences and Series Definition and analysis of sequences, including arithmetic and geometric Definition and analysis of series, including arithmetic and geometric Binomial theorem (Optional) Preview of Calculus Finding limits using tables and graphh Algebra techniques for finding limits (Consider integrating into D1) One-sided limits; continuous functions Introductions to the tangent line problem and the definition of the derivative Introduction to the ar ea problem and the definition of the definite integral

Method(s) of Instruction

- Lecture (02)

Instructional Techniques

Lecture, discussion, written homework

Reading Assignments

Assigned from textbook. 1 hour

Writing Assignments

Writing is encouraged throughout the course but is not necessarily a part of the grading or exams. 1 hour

Out-of-class Assignments

Assigned written homework, problem solving exercises. 6 hour

Demonstration of Critical Thinking

Several written tests and a comprehensive final

Required Writing, Problem Solving, Skills Demonstration

Writing is encouraged throughout the course but is not necessarily a part of the grading or exams.

Eligible Disciplines

Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Sullivan, Michael. Precalculus, 11th ed. Pearson, 2020
Rationale: This is a standard textbook that covers the course content.