



PRECALCULUS

21:640:114 (4 credits)

COURSE DESCRIPTION: We will be studying the functions and their graphs needed in calculus and higher mathematics: polynomial, rational, algebraic, logarithmic, exponential, trigonometric, and inverse functions, solutions of nonlinear inequalities, and analytic geometry.

PREREQUISITES: 21:640:109 (College Algebra for Science and Business) or placement by examination.

IMPORTANT NOTE: This course is intended for students who intend to enroll in 21:640:135 (Calculus I). Students who intend to enroll in 21:640:119 (Basic Calculus) should enroll directly in that course without taking this course.

TEXTBOOK: "Precalculus," 11th edition, by Sullivan, published by Pearson, ISBN 0-321-97907-9. The special discounted package of this book is the loose-leaf three-hole punched version with MyMathLab access. This is available **ONLY** at the Barnes & Noble Bookstore located in the Hahne's Building 42 Halsey Street.

Purchasing this package of the loose-leaf version and the MyMathLab access code together will result in considerable savings. This purchase also gives access to the electronic version of the textbook at no extra cost. **If students do not purchase this special discounted package, they are still required to purchase a MyMathLab access code, which also gives access to the electronic version of the textbook at no additional cost.**

CALCULATORS: Only scientific calculators (not graphing calculators) can be used and their use is limited to particular areas of the course. Those areas will be specified as we progress through the semester. Calculators on cell phones, smart phones or tablets may not be used.

DEPARTMENT WEB SITE: <http://www.ncas.rutgers.edu/math>

FREE TUTORING: is available in the Rutgers Learning Center, Room 140 Bradley Hall, (973-353-5608.)

THIS COURSE COVERS THE FOLLOWING CHAPTERS AND SECTIONS:

Chapter 1 – Graphs

- 1.1 – The Distance and Midpoint Formulas
- 1.2.4 – Symmetry
- 1.4 – Circles

Chapter 2 – Functions and Their Graphs

- 2.1 – Functions

- 2.2 – The Graph of a Function
- 2.3 – Properties of Functions
- 2.4 – Library of Functions; Piecewise-defined Functions
- 2.5 – Graphing Techniques: Transformations
- 2.6 – Mathematical Models: Building Functions

Chapter 3 – Linear and Quadratic Functions

- 3.1 – Linear Functions and Their Properties
- 3.3 – Quadratic Functions and Their Properties
- 3.4.1 – Build Quadratic Functions from Verbal Descriptions
- 3.5 – Inequalities Involving Quadratic Functions

Chapter 4 – Polynomial and Rational Functions

- 4.1 – Polynomial Functions and Models (reading & homework)
- 4.2 – Properties of Rational Functions (briefly)
- 4.3 – The Graph of a Rational Function
- 4.4 – Polynomial and Rational Inequalities
- 4.5.1 – The Remainder and Factor Theorems
- 4.5.7 – The Intermediate Value Theorem
- 4.6 – Complex Zeros; Fundamental Theorem of Algebra (optional)

Chapter 5 – Exponential and Logarithmic Functions

- 5.1 – Composite Functions
- 5.2 – One-to-One Functions; Inverse Functions
- 5.3 – Exponential Functions
- 5.4 – Logarithmic Functions
- 5.5 – Properties of Logarithms
- 5.6 – Logarithmic and Exponential Equations
- 5.8.1 – Exponential Growth Models
- 5.8.2 – Exponential Decay Models
- 5.8.3 – Newton’s Law of Cooling

Chapter 6 – Trigonometric Functions

- 6.1 – Angles and Their Measures
- 6.2 – Trigonometric Functions: Unit Circle Approach
- 6.3 – Properties of the Trigonometric Functions
- 6.4 – Graphs of the Sine and Cosine Functions
- 6.5 – Graphs of the Other Trigonometric Functions
- 6.6.1 – Phase Shift

Chapter 7 – Analytic Trigonometry

- 7.1 – The Inverse Sine, Cosine and Tangent Functions
- 7.2 – The Inverse Trigonometric Functions (Continued)
- 7.3 – Trigonometric Equations
- 7.4 – Trigonometric Identities
- 7.5 – Sum and Difference Formulas
- 7.6 – Double-angle and Half-angle Formulas
- 7.7.1 – Product-to-Sum Formula

Chapter 8 – Applications of Trigonometric Functions

- 8.1 – Right Angle Trigonometry; Applications
- 8.2 – The Law of Sines
- 8.3 – The Law of Cosines
- 8.4.1 – The Area of SAS Triangles

Chapter 9 – Polar Coordinates; Vectors

9.1 – Polar Coordinates

9.2 – Polar Equations and Graphs (optional)

Chapter 10 – Analytic Geometry

10.1 – Conics

10.2 – The Parabola

10.3 – The Ellipse

10.4 – The Hyperbola

10.5 – Rotation of Axes; General Form of a Conic

Chapter 12 – Sequences

12.1 – Sequences (optional)

Effective date: Fall 2015

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