

MAT 296: Calculus II

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Calculus II

(4 credits)

Class Size: 10-25

Faculty: Dr. Duane T. Graysay, Associate Professor, Syracuse University

Administrative Contact: [Tavish Van Skoik](#), Assistant Director, Project Advance

Course Catalog Description

Integration: the definite integral and applications; trigonometric functions, methods of integration, improper integrals, infinite series, elementary differential equations, parametric equations, polar coordinates. Shared Competencies Scientific Inquiry and Research Skills

Course Overview

MAT 296 comprises the second four credits of the first-year calculus sequence required of all science and engineering students at Syracuse University. The exponential logarithm and inverse trigonometric functions are defined and their calculus developed. Topics covered in the course include: separable and linear differential equations, especially as they relate to exponential growth.; L'Hopital's rule and limits of indeterminate forms, with applications to improper integrals; techniques of integration including: by parts, by partial fractions, and by trigonometric substitution; a brief introduction to calculus in polar coordinates and calculus of parametric curves; infinite sequences, convergence and divergence; infinite series, ratio test, root test, comparison

test, integral test and alternating series test; power series and computations with power series, radius of convergence; and Taylor and Maclaurin series.

1. Definition and properties of the natural logarithm. Definition and properties of the exponential function. The calculus of logs and exponentials.
2. L'Hopital's rule and indeterminate forms.
3. Separable and linear differential equations with applications, especially growth and decay models.
4. Definition and properties of inverse trigonometric functions, and the calculus of these functions.
5. Techniques of integration: review of substitution, completing the square, long division, etc. Integration by parts. Integration of powers of trigonometric functions. Integration by partial fractions. Integration by trigonometric substitutions.
6. Improper integrals.
7. Polar coordinates, areas in polar coordinates.
8. Infinite sequences, convergence and divergence, the bounded monotonic sequence property.
9. Infinite series, the geometric series, properties of series, the nth term test, the harmonic series.
10. Taylor series and polynomials, Taylor's formula with remainder, approximation, Maclaurin series.
11. The integral test, comparison test, alternating series test, absolute convergence, the root test, the ratio test.
12. Power series, radius of convergence, interval of convergence. Differentiation and integration of power series.
13. Approximations and computation using power series.
14. Calculus of parametric curves.

Pre- / Co-requisites

PREREQ MAT 295 WITH MINIMUM GRADE C-

Course Objectives

N/A

Laboratory

N/A

Required Materials

Stewart's Essential Calculus: Early Transcendentals, second edition: https://www.stewartcalculus.com/media/13_home.php

Texas Instruments: TI-83 Plus – OR – TI-84 Plus (D & H distributing, 8000-340-1006, educational sales for bulk orders)

Instructor Recommendations

N/A