



## SYRACUSE UNIVERSITY

### **MAT 296** **Calculus II** **2017-2018** **(4 credits)**

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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.

### **Course Outline**

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.

