

Single Variable Calculus – 2nd Semester TCSU MATH 220

A. Description

Differential and integral calculus of a single variable. Integration, techniques of integration; infinite sequences and series; applications of differentiation and integration.

B. Recommended Preparation

Three years of high school mathematics (or equivalent); college level courses in the study of functions to include polynomial, rational, algebraic, trigonometric, exponential, logarithmic, and other transcendental functions.

C. Prerequisites

Single Variable Calculus – 1st semester

D. Minimum Unit Requirement

4 semester units

E. Course Topics

Remaining topics on differentiation and integration from the single variable calculus descriptor not covered in the first semester, parametric equations, polar curves, conic sections, sequences, series, power series, Taylor and Maclaurin series, binomial series. A suggested list of topics could include:

1. Derivatives of inverse functions
2. Logarithmic and exponential functions and their derivatives
3. Logarithmic differentiation
4. Inverse trigonometric functions and their derivatives
5. Indeterminate forms and L'Hopital's Rule
6. Techniques of integration; trigonometric integrals, trigonometric substitution, partial fractions
7. Numerical integration; trapezoidal and Simpson's rule
8. Improper integrals
9. Applications; arc length, area of a surface of revolution, moments and centers of mass
10. Separable first order differential equations
11. Exponential growth and decay
12. Parametric equations, calculus with parametric curves
13. Polar curves, calculus in polar coordinates
14. Conic sections
15. Sequences; convergence, divergence
16. Series; convergence and divergence, alternating series
17. Tests for convergence of series (including integral test, comparison tests, ratio test, and root test), divergence test

18. Estimating the sum of a series
19. Power series, radius of convergence, interval of convergence
20. Differentiation and integration of power series
21. Taylor and Maclaurin series; Taylor's Inequality
22. Binomial series

F. Student Learning Outcomes

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

1. Evaluate a definite integral as a limit;
2. Evaluate a definite integral using integration formulas;
3. Find indefinite integrals;
4. Apply integration methods;
5. Find areas and volumes by integration;
6. Determine the limit of convergent sequences;
7. Determine the limit of convergent series; and
8. Represent functions as power series