

Course Objectives/Course Outline
Spokane Community College

Course Title: Calculus III

Prefix and Course Number: MATH& 153

Course Learning Outcomes:

By the end of this course, a student should be able to:

- Communicate mathematical ideas in both everyday and mathematical language, using appropriate vocabulary and notation.
- Determine convergence, divergence, and limits of given sequences.
- Identify harmonic series, p-series and alternating series.
- Use appropriate tests to determine convergence or divergence of infinite series.
- Determine the interval of convergence for power series.
- Compute and apply Taylor Series.
- Recognize vectors, compute vector magnitudes and perform basic vector operations.
- Compute and use dot products and cross products of 3-dimensional vectors.
- Identify and find equations of lines and planes in 3-dimensions. Identify and graph quadratic surface.
- Apply calculus techniques such as limits, derivatives, and integrals to 3-dimensional vector-values functions, including modeling applications.

Course Outline:

- I. Infinite Series
 - A. Sequences of Numbers
 - i. Limits
 - ii. Convergence/Divergence
 - iii. Subsequences
 - iv. Bounded Sequences
 - B. Series
 - i. Infinite Series
 - ii. Partial Sums
 - iii. Harmonic and p-Series
 - C. Convergence or Divergence of Non-negative Series
 - i. Integral Test
 - ii. Direct Comparison Test
 - iii. Limit Comparison Test
 - iv. Ratio Test
 - v. n^{th} Root Test
 - D. Alternating Series
 - i. Alternating Series Test
 - ii. Absolute Convergence/Conditional Convergence
 - E. Power Series
 - i. Convergence and Interval of Convergence
 - F. Taylor Series
 - i. Taylor Polynomials
 - ii. Taylor's Theorem
 - G. Maclaurin Series
 - H. Fourier Series •
- Optional

- II. Geometry of Space (3-dimensions)
 - A. Three-Dimensional Coordinate System
 - i. Distance
 - ii. Midpoints
 - iii. Sets of Points
 - B. Vectors
 - i. Operations
 - ii. Magnitude
 - C. Dot Product
 - i. Properties
 - ii. Angle between Vectors
 - iii. Vector Projections
 - D. Cross Product
 - E. Lines in Space
 - i. Vector Equations
 - ii. Parametric Equations
 - F. Planes in Space
 - i. Vector Equations
 - ii. Component Equations
- III. Vectors and Motion in Space (3-dimensions)
 - A. Cylinders
 - B. Quadric Surfaces
 - C. Vector-Valued Functions
 - i. Limits
 - ii. Derivatives
 - iii. Integrals
 - iv. Arc Length
 - v. Tangents and Unit Tangent Vector
 - vi. Curvature
 - vii. Tangential and Normal Components of Acceleration •
 - D. Planetary/Satellite Motion and Orbits •

- Optional