

Course Objectives/Course Outline
Spokane Community College

Course Title: Calculus I

Prefix and Course Number: MATH& 151

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.
- Use numerical, graphical, algebraic techniques and L'Hopital's Rule to solve limit problems.
- Use the product, quotient, chain, and implicit rules of differentiation to find the first, second, and third derivatives of functions.
- Use limits to determine if a function is continuous.
- Use the first and second derivatives of a function to curve sketch functions.
- Describe and apply the Mean Value Theorem.
- Describe and apply the Fundamental Theorem of Calculus.
- Apply the ideas of calculus to real-world problems involving related rates and optimization.
- Take the antiderivative/integral of functions.
- Judge the reasonableness of a solution and justify all processes used to obtain the solution.

Course Outline:

- I. Pre-Calculus Review
 - A. Lines and the Cartesian Coordinate System
 - B. Functions and Graphs
 - C. Exponential Functions
 - D. Inverse Functions and Logarithms
 - E. Trigonometric Functions and Their Inverses
 - F. Parametric Equations
 - G. Modeling
- II. Introduction to Limits and Continuity
 - A. Rates of Change
 - B. Limits
 - C. One-Sided Limits
 - D. Limits Involving Infinity
 - E. Continuity
 - F. Tangent Lines
- III. Derivatives
 - A. The Derivative as a Function
 - B. The Derivative as a Rate of Change
 - C. Derivative Rules
 - i. Product Rule
 - ii. Quotient Rule
 - iii. Power Rule
 - iv. Chain Rule
 - D. Trigonometric Derivatives
 - E. Higher Order Derivatives
 - F. Derivatives of Parametric Equations
 - G. Implicit Differentiation

- IV. Applications of Derivatives
 - A. Related Rate Problems
 - B. Derivatives and Functions
 - i. Extreme Values of Functions
 - ii. Maxima –Minima Problems
 - iii. Optimization
 - iv. Derivatives and Graphs
 - v. Curve Sketching
 - C. Mean Value Theorem
 - D. Linearizations and Differentials
 - E. Newton's Method for Finding Zeros
- V. Integration
 - A. Indefinite Integrals
 - i. Antiderivatives
 - ii. Introduction to Differential Equations
 - B. Integral Rules/ Substitution
 - C. Definite Integrals
 - i. Finite Sum Approximations
 - ii. Riemann Sums
 - iii. Area Problems
 - D. Mean Value Theorem for Integrals
 - E. Fundamental Theorem of Calculus.
 - F. Numerical Integration
 - i. Midpoint Rule
 - ii. Trapezoidal Rule
 - iii. Simpson's Rule
 - iv. Approximations using Technology