

Scope and Sequence

Mathematics

Calculus 300

Description:

Students will explore, develop and study topics in the differentiation and integration of algebraic, trigonometric and transcendental functions. Students will extend these topics and study their application to the field of mathematics, finance, medicine, and other disciplines. The use of technology and the graphing calculator is essential and required in this course.

Departmental assessments are given to measure individual student, class, and grade level achievement in math. Data are collected by each teacher and used to monitor progress and make plans for instruction. End of quarter, end of semester and/or end of course exams may be used.

Unit Name/Description	Content and/or Skills
Review of Precalculus Topics	Factoring Linear functions Exponential functions Logarithmic functions Rational functions Unit Circle Trigonometry Interval notation

Limits and Continuity	<p>Define and calculate limits for function values and applying the properties of limits</p> <p>Find and verify end behaviors for various functions</p> <p>Calculate limits as x approaches positive and negative infinity and identify vertical and horizontal asymptotes</p> <p>Identify the intervals upon which a given function is continuous</p> <p>Understand the meaning of continuous functions</p> <p>Understand the concept of removable discontinuity</p>
Definition of the Derivative	<p>Find the average rate of change of a function</p> <p>Write the equation of a tangent and normal line to a curve at a given point</p> <p>Explore and use the definition of the derivative</p> <p>Graph the function given the graph of the derivative and vice versa</p> <p>Determine where a function is not differentiable</p>
Rules of Differentiation	<p>Explore and apply the rules of differentiation including;</p> <ul style="list-style-type: none"> ● Power rule ● Product and Quotient Rule ● Chain Rule ● Exponential and Logarithmic Functions ● Second and Higher Order derivatives ● Trigonometric Functions <p>Applications to physics with velocity and other rates of change</p>
Graphs and the Derivative	<p>Use the First and Second Derivative Tests to determine the local extreme values of a function</p> <p>Determine the concavity of a function</p> <p>Locate the points of inflection by analyzing the second derivative</p> <p>Applications of the derivative involving optimization problems</p>
Midterm Exam	Departmental review and midterm exam

Implicit Differentiation and Related Rates	Find derivatives using implicit differentiation Solve and apply related rate problems to real world situations
Antiderivatives	Basic rules of antiderivatives Determine the value of C given the initial condition Application problems of antiderivatives Substitution method of integration
Definite Integrals	Area using the rectangular approximation method Fundamental Theorem of Calculus Average value of a function Area Between Two Curves
Volume	Find volumes of solids of revolution using the disc and washer method
Additional Topics in Calculus	Integration by Parts Techniques of Integration Improper Integrals