SAN JUAN COLLEGE
Success Matters

MATH-1510 CALCULUS I 3 CREDITS

SYLLABUS

CATALOG DESCRIPTION

Introduces the intuitive, numerical and theoretical concepts of limits, continuity, differentiation and integration. Includes the study of extrema, curve sketching, and applications involving algebraic, exponential, logarithmic and trigonometric functions. Designed for mathematics, science and engineering majors.

Prerequisites: High School Calculus course of C or better, GPA of 3.2 or higher or enroll in MATH 1240 and 1230 or MATH 1250 or lower.

Semester Offered: Fall, Spring

COMMON STUDENT LEARNING OUTCOMES

Upon successful completion of San Juan College programs and degrees, the student will demonstrate competency in…

BROAD AND SPECIALIZED LEARNING

Students will actively and independently acquire, apply, and adapt skills and knowledge with an awareness of global contexts.

CRITICAL THINKING

Students will think analytically and creatively to explore ideas, make connections, draw conclusions and solve problems.

CULTURAL AND CIVIC ENGAGEMENT

Students will act purposefully, reflectively, and ethically in diverse and complex environments.

EFFECTIVE COMMUNICATION

Students will exchange ideas and information with clarity in multiple contexts.

INFORMATION LITERACY

Students will be able to recognize when information is needed and have the ability to locate, evaluate, and use it effectively.

INTEGRATING TECHNOLOGIES

Students will demonstrate fluency in the application and use of technologies in multiple contexts.

Student work from this class may be randomly selected and used anonymously for assessment of course, program, and/or institutional learning outcomes. For more information, please refer to the Dean of the appropriate School.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, the student will be able to…

1. Limits

a. Use limit notation.
b. Compute limits or determine when a limit does not exist.
c. Use limits to decide if a function is continuous.
d. Use limits to decide if a function is differentiable.
e. Use limits to determine asymptotes.

2. Derivatives
   a. Determine the derivative of a simple function, at a point as well as more generally, using the definition of the derivative.
   b. Determine the derivatives of algebraic and transcendental functions using the General Power, Product, Quotient, Chain Rules, implicit differentiation and the linearity of the differential operator.
   c. Describe the meaning of the derivative as a rate of change in a variety of contexts.
   d. Use derivatives to sketch graphs of functions with details showing critical points and their natures, inflection points, noting monotonicity, and concavity, connecting these to features found algebraically, such as intercepts and asymptotes.
   e. Compute local linear approximation.
3. Integrals
   a. Compute definite integrals using the limit definition and sigma notation.
   b. Approximate definite integrals using finite sums.
   c. Compute indefinite integrals by identifying them with antiderivatives.
   d. Compute definite and indefinite integrals using substitution.
   e. Describe the meaning of the integral in a variety of contexts.
4. Applications of calculus
   a. Solve optimization problems, related rate problems and motion problems involving position, velocity, speed and acceleration using differentiation and integration.
   b. Compute area bounded by functions and vertical lines.
   c. Be able to apply theorems of calculus such as the Fundamental Theorem, the Intermediate Value Theorem, the Mean Value Theorem, the Mean Value Theorem of Integration, and the Extreme Value Theorem.