MATH 189 – CALCULUS II | 4 CREDITS

SYLLABUS

CATALOG DESCRIPTION

A continuation of Math 188; extending to Techniques of Integration, Numerical Integration, Applications of Integration, Infinite Series, Power Series, Maclaurin & Taylor Series and Taylor Polynomials. Mathematical software will be utilized throughout the course to expose students to computer algebra systems.

Prerequisites: MATH 188 with a grade of "C" or better.

Semester Offered: Fall, Spring and Summer

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.

General Learning Outcomes

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

A. Indefinite and Definite Integration
B. Various Methods/Techniques of Integration
C. Applications of Integration
D. Parametric Equations & Polar Coordinates
E. Infinite Sequences & Series

Specific Learning Outcomes

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

A. Review of Indefinite & Definite Integration

A1. Be proficient in the basic techniques of differentiation and integration, alone and/or in combination.

B. Various Methods/Techniques of Integration

B1. Be able to integrate using the following techniques:
- a. substitution
- b. integration by parts
- c. trigonometric integrals
- d. trigonometric substitution
- e. partial fractions

B2. Be able to use a table of integrals

B3. Be able to perform numerical integration using: the Midpoint Rule, Trapezoid Rule and Simpson's Rule.

B4. Be able to compute improper integrals

C. Applications of Integration

C1. Be able to use definite integrals to find areas under curves and between curves

C2. Understand volumes of rotation and be able to use integration to calculate volumes of solids of rotation using
- a. Disk & Washer Method
- b. Cylindrical Shells Method

C3. Understand how calculus is used to find arc length and be able to find the length of a curve using the arc length formula.

C4. Be able to find surface area obtained when rotating a curve around either the x- or y-axis.

C5. Be able to apply definite integrals to solve problems business, sciences and engineering.

D. Parametric Equations & Polar Coordinates

D1. Understand the definition of parametric equations and be able to graph them.

D2. Be able to find tangent lines to curves, find area under curves, and find the arc length of curves defined parametrically. (bonus)

D3. Be able to find surface areas. (bonus)

D4. Understand the relation between polar coordinates and rectangular coordinates and be able to convert from one system to the other.

D5. Understand and be able to analyze curves described by polar equations

D6. Be able to find tangent lines, arc length and area of curves described by polar equations. (bonus)

E. Infinite Sequences & Series

E1. Understand the difference between sequences and series. Be able to analyze sequences and series (infinite and finite)

E2. Be able to determine whether a series converges (absolutely or conditionally) or diverges by recognizing the form or using the appropriate test, including:
   a. geometric series (Be able to find the sum, if appropriate)
   b. p-series, alternating p-series
   c. the comparison tests
   d. the alternating series test
   e. the integral test
   f. the ratio test
   g. the root test

E3. Be able to analyze a power series to:
   a. determine the radius of convergence and interval of convergence
   b. derive new power series from previously defined power series using substitution, differentiation, or integration

E4. Be able to find the Taylor and MacLaurin series expansions for a function and determine the radius and interval of convergence.

Other Requirements:

The TI-82, TI-83, TI-84, TI-85 or TI-86 graphing calculator is required for the course (TI-Nspire calculators that are equivalent to these are acceptable). A **TI-83 Plus or TI-84 Plus Graphing Calculator** is strongly recommended. Graphing calculators capable of symbolic manipulation (such as TI-89, TI-92, TI-Nspire CAS systems and other such calculators) will not be allowed on examinations, the final exam and where the instructor sees fit.