

College of San Mateo
Official Course Outline

1. COURSE ID: MATH 242 **TITLE:** Applied Calculus II

Units: 3.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; and 96.0-108.0 Homework hours

Method of Grading: Letter Grade Only

Prerequisite: MATH 130, and MATH 241

Recommended Preparation:

Eligibility for READ 400 or equivalent level of reading proficiency.

2. COURSE DESIGNATION:

Degree Credit

Transfer credit: CSU; UC

CSU GE:

CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B4 -

Mathematics/Quantitative Reasoning

IGETC:

IGETC Area 2: MATHEMATICAL CONCEPTS AND QUANTITATIVE REASONING: A: Math

3. COURSE DESCRIPTIONS:

Catalog Description:

Further work in differentiation and integration, trigonometric functions, calculus of functions of several variables, and selected topics from differential equations.

4. STUDENT LEARNING OUTCOME(S) (SLO'S):

Upon successful completion of this course, a student will meet the following outcomes:

1. Compute partial derivatives of functions of several variables
2. Solve extremum problems, using a) partial derivatives and b) Lagrange multipliers.
3. Find derivatives and integrals of trigonometric functions
4. Use techniques of integration, including algebraic and trigonometric substitutions, integration by parts, and partial fractions, to evaluate definite and indefinite integrals.
5. Use numerical methods to estimate the value of definite integrals.
6. Evaluate improper integrals.
7. Solve certain types of differential equations, including separable equations and $y' = g(y)$.
8. Find Taylor and Maclaurin series of functions, and use Taylor polynomials for approximations.
9. Solve application problems.

5. SPECIFIC INSTRUCTIONAL OBJECTIVES:

Upon successful completion of this course, a student will be able to:

1. Compute partial derivatives of functions of several variables.
2. Solve extremum problems, using a) partial derivatives and b) Lagrange multipliers.
3. Find derivatives and integrals of trigonometric functions
4. Use techniques of integration, including algebraic and trigonometric substitutions, integration by parts, and partial fractions, to evaluate definite and indefinite integrals.
5. Use numerical methods to estimate the value of definite integrals.
6. Evaluate improper integrals.
7. Solve certain types of differential equations, including separable equations and $y' = g(y)$.
8. Find Taylor and Maclaurin series of functions, and use Taylor polynomials for approximations.
9. Solve application problems.

6. COURSE CONTENT:

Lecture Content:

1. Functions of Several Variables
 - A. Examples, with equations, graphs, and level curves
 - B. Partial derivatives and rates of change
 - C. Maxima and minima: first- and second-derivatives tests
 - D. Lagrange multipliers
 - E. Method of least squares
 - F. Double integrals as volumes; iterated integrals

2. Trigonometric Functions
 - A. Differentiation of sine and cosine: formulas and heuristic justification
 - B. The other trigonometric functions: definitions, graphs, and derivatives
 - C. Radian measure
3. Techniques of Integration
 - A. Substitution
 - B. Parts
 - C. Numerical integration (Midpoint Rule, Trapezoidal Rule, Simpson's Rule; error bounds)
 - D. Improper Integrals as limits of definite integrals; convergence and divergence
4. Differential Equations
 - A. Examples: $y' = Ky$, $y' = f(t)$; solutions, applications
 - B. Separation of variables
 - C. Numerical solutions: Euler's Method
 - D. Qualitative Theory: $y' = g(y)$ and graphs of its solutions
 - E. Applications: logistic equation
5. Taylor Polynomials and Infinite Series
 - A. Taylor Polynomials and approximations; the derivative remainder formula
 - B. Infinite series; partial sums, convergence and divergence, geometric and harmonic series
 - C. Optional topics:
 - a. The Newton-Raphson Algorithm for approximating zeros of functions
 - b. Series with positive terms: integral test, direct comparison test
 - c. Taylor Series; radius of convergence of power series; application to integration
6. Probability and Calculus (optional)
 - A. Discrete random variables: mean, standard deviation and variance; expected value
 - B. Continuous random variables: probability density functions and cumulative distribution functions
 - C. Expected value and variance for continuous random variables; uniform distribution
 - D. Optional topics:
 - a. Exponential and normal random variables
 - b. Poisson and geometric random variables

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Discussion
- C. Other (Specify):
 - a. Out-of-class assignments: students will need to complete assigned problems and projects.
 - b. Reading assignments: Instructor will assign text readings for discussion of a topic in class.
 - c. Writing assignments:
 1. Students will submit written homework assignments.
 2. Students may be assigned papers including mathematical modeling.
 - d. Critical thinking:
 1. Lecture/discussion to understand problem-solving process.
 2. Students will practice critical thinking in small group problem solving.
 3. Students will evaluate proposed solutions in light of constraints of the problem.
 - e. Resources available on the internet may be used to augment the text.

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

- Students will submit written and/or online homework assignments.
 Students may be assigned papers including mathematical modeling.

Reading Assignments:

Instructor may assign text readings for discussion of a topic in class.

Other Outside Assignments:

Student will need to complete assigned problems and projects.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Class Participation
- B. Exams/Tests
- C. Homework
- D. Quizzes
- E.
 - a. Written individual assignments and/or journal- to demonstrate individual student progress toward objectives.
 - b. Small group presentations - to demonstrate student participation in problem-solving process

c. Written exams/quizzes - to reflect student knowledge of vocabulary, concepts, and application of concepts to problem-solving as presented in lectures and discussion, small group sessions, and text readings. d. Final Examination - to reflect student knowledge of vocabulary, concepts, and applications of concepts to problem-solving as presented in lectures and discussions, small group sessions, and text readings. e. Participation - to reflect student involvement in class discussions, small group sessions and presentations, etc.

10. **REPRESENTATIVE TEXT(S):**

Possible textbooks include:

A. Goldstein, L. Schneider, D. Lay and N. Asmar. *Calculus and Its Applications*, 14th ed. Prentice-Hall, 2017

Origination Date: November 2017

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Course Originator: Christopher Walker