**MATH 16 Course Outline as of Fall 2014**

# CATALOG INFORMATION

Dept and Nbr: MATH 16          Title: INTRO TO MATH ANALYSIS
Full Title: Introduction to Mathematical Analysis
Last Reviewed: 1/9/2024

| Units | | Course Hours per Week | | Nbr of Weeks | Course Hours Total | |
|---|---|---|---|---|---|---|
| Maximum | 4.00 | Lecture Scheduled | 4.00 | 17.5 | Lecture Scheduled | 70.00 |
| Minimum | 4.00 | Lab Scheduled | 0 | 6 | Lab Scheduled | 0 |
| | | Contact DHR | 0 | | Contact DHR | 0 |
| | | Contact Total | 4.00 | | Contact Total | 70.00 |
| | | Non-contact DHR | 0 | | Non-contact DHR | 0 |

Total Out of Class Hours: 140.00          Total Student Learning Hours: 210.00

Title 5 Category:  AA Degree Applicable
Grading:           Grade or P/NP
Repeatability:     00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:
Formerly:

**Catalog Description:**
Exponential and logarithmic functions, limits, differential and integral calculus with applications, partial derivatives, and calculator techniques.  Emphasis on applications in business and economics.

**Prerequisites/Corequisites:**
Completion of MATH 154 or higher (VE)

**Recommended Preparation:**


**Limits on Enrollment:**


**Schedule of Classes Information:**
Description: Exponential and logarithmic functions, limits, differential and integral calculus with applications, partial derivatives, and calculator techniques.  Emphasis on applications in business and economics. (Grade or P/NP)
Prerequisites/Corequisites: Completion of MATH 154 or higher (VE)
Recommended:
Limits on Enrollment:

Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

# ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

| AS Degree: | Area | | Effective: | Inactive: |
|---|---|---|---|---|
| | B | Communication and Analytical Thinking | Fall 1981 | |
| | MC | Math Competency | | |
| CSU GE: | Transfer Area | | Effective: | Inactive: |
| | B4 | Math/Quantitative Reasoning | Fall 1981 | |
| IGETC: | Transfer Area | | Effective: | Inactive: |
| | 2A | Mathematical Concepts & Quantitative Reasoning | Fall 1981 | |

| CSU Transfer: | Transferable | Effective: | Fall 1981 | Inactive: |
|---|---|---|---|---|
| UC Transfer: | Transferable | Effective: | Fall 1981 | Inactive: |

**CID:**
CID Descriptor: MATH 140    Business Calculus
SRJC Equivalent Course(s):    MATH16

**Certificate/Major Applicable:**
Major Applicable Course

# COURSE CONTENT

**Outcomes and Objectives:**
Upon successful completion of the course, students will be able to:
1. Perform advanced operations with functions (using symbolic, graphical, and numerical representations) and apply knowledge to modeling problems.
2. Define and graph inverse functions.
3. Recognize and describe the characteristics of polynomial, rational, algebraic, exponential and logarithmic functions, and utilize these in graphing the functions.
4. Solve equations graphically and algebraically.
5. Calculate limits and use limit notation.
6. Define the derivative and calculate derivatives of polynomial, rational, algebraic, exponential, and logarithmic functions.
7. Use techniques of differentiation, including product, quotient and chain rules.
8. Use derivatives as an aid to graphing, in optimization problems, and to analyze business and economic applications.
9. Calculate antiderivatives.
10. Evaluate definite integrals using the fundamental theorem of calculus.
11. Use partial differentiation and the method of LaGrange multipliers in optimization problems.

**Topics and Scope:**

I.   Functions
    A. Symbolic, graphical, and numerical representations
    B. Operations and composition

    C. Inverse functions
    D. Modeling with functions
II.   Graphs of functions
    A. Definition and characteristics
    B. Graphical and algebraic solutions and numerical solutions of equations
    C. Graphs of polynomial, rational, algebraic, exponential and logarithmic functions
    D. Graphs of inverse functions
III.  Differential calculus
    A. Limits of functions
    B. Increments, tangent lines, and rate of change
    C. Derivatives (including exponential and logarithmic functions)
    D. Techniques of differentiation (including sum, product, quotient, and chain rules, and implicit differentiation.)
    E. Applications of the derivatives (including marginal analysis, optimization, and curve sketching)
    F. Antiderivatives
IV.  Integral calculus
    A.  Definite and indefinite integrals and the fundamental theorem of calculus
    B. Integration by substitution
    C. Tables of integrals
    D. Applications of integration (area between curves, and applications to business and economics)
    E. Approximations to the definite integral
V.   Multivariable calculus
    A. Multivariable functions
    B. Partial differentiation
    C. Relative max/min in two variables
    D. LaGrange multipliers

**Assignment:**

1. Reading outside of class (0-50 pages per week)
2. Homework problem sets  (10-30)
3. Exams (3-7) and quizzes (0-30)
4. Projects (e.g. computer exploration or game analysis)  (0-2)

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills
and/or require students to select, organize and explain ideas
in writing.

| | Writing<br>0 - 0% |
|---|---|
| None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course. | |

**Problem Solving:** Assessment tools, other than exams, that
demonstrate competence in computational or non-
computational problem solving skills.

| Homework problem sets | | Problem solving 5 - 20% |
|---|---|---|

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

| None | | Skill Demonstrations 0 - 0% |
|---|---|---|

**Exams:** All forms of formal testing, other than skill performance exams.

| Objective exams and quizzes | | Exams 70 - 95% |
|---|---|---|

**Other:** Includes any assessment tools that do not logically fit into the above categories.

| Projects | | Other Category 0 - 10% |
|---|---|---|

**Representative Textbooks and Materials:**
Calculus With Applications (10th ed.).  Lial, Margaret; Greenwell, Raymond; Ritchey, Nathan. Pearson  2011.
Calculus And Its Applications (13th ed). Goldstein, Larry; Lay, David; Schneider, David. Pearson 2013.