

**MATH 16 Course Outline as of Summer 2019****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:**

Presents techniques of calculus with emphasis placed on the application of these concepts to business and management related problems. The applications of derivatives and integrals of functions including polynomials, rational, exponential and logarithmic functions are studied.

**Prerequisites/Corequisites:**

Completion of MATH 154 or MATH 156 or MATH 155 or AB705 placement into <https://assessment.santarosa.edu/understanding-your-math-placement> Math Tier 3 or higher

**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: Presents techniques of calculus with emphasis placed on the application of these concepts to business and management related problems. The applications of derivatives and integrals of functions including polynomials, rational, exponential and logarithmic functions are studied. (Grade or P/NP)

Prerequisites/Corequisites: Completion of MATH 154 or MATH 156 or MATH 155 or AB705 placement into <https://assessment.santarosa.edu/understanding-your-math-placement> class='NormalSiteLink' target='\_New'>Math Tier 3 or higher</a>

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;UC.

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:	
	B	Communication and Analytical Thinking	Fall 1981	
	MC	Math Competency		

<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:	
	B4	Math/Quantitative Reasoning	Fall 1981	

<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:	
	2A	Mathematical Concepts & Quantitative Reasoning	Fall 1981	

<b>CSU Transfer:</b>	Transferable	Effective:	Fall 1981	Inactive:
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<b>UC Transfer:</b>	Transferable	Effective:	Fall 1981	Inactive:
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### **CID:**

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

### **Certificate/Major Applicable:**

Major Applicable Course

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Perform methods of differentiation on algebraic, exponential, and logarithmic functions.
2. Perform techniques of integration, including substitution, on algebraic and exponential functions.
3. Apply calculus to find area between curves and to solve applied problems, with emphasis in the fields of business and economics.

### **Objectives:**

At the conclusion of this course, the student should be able to:

1. Find the derivatives of polynomial, rational, exponential, and logarithmic functions
2. Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule
3. Sketch the graph of functions using horizontal and vertical asymptotes, intercepts, and first and second derivatives to determine intervals where the function is increasing and decreasing, maximum and minimum values, intervals of concavity and points of inflection
4. Analyze the marginal cost, profit and revenue when given the appropriate function
5. Determine maxima and minima in optimization problems using the derivative

6. Use derivatives to find rates of change and tangent lines
7. Use calculus to analyze revenue, cost, and profit
8. Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques
9. Use integration in business and economics applications
10. Use concepts in multivariable calculus to solve application problems

### **Topics and Scope:**

- I. Functions and their Graphs
  - A. Definition and characteristics
  - B. Symbolic, graphical, and numerical representations
  - C. Operations and composition
  - D. Modeling with functions
  - E. Graphical and algebraic solutions of equations
  - F. Graphs of polynomial, rational, algebraic, exponential and logarithmic functions
- II. Limits and Intuitive Limit Definition of Derivative
- III. Increments, Tangent Lines, and Rate of Change
- IV. Rules of Differentiation
  - A. Sum, product, and quotient
  - B. Chain rule
- V. Implicit Differentiation
- VI. Applications of Derivatives
  - A. Marginal analysis
  - B. Optimization
  - C. Curve sketching
  - D. Relative rate of change
  - E. Elasticity of Demand
- VII. Antiderivatives, Indefinite and Definite Integrals
- VIII. Multiple Techniques of Integration
  - A. Rules of integration including sum and difference, power, and exponential (base e)
  - B. Substitution
- IX. Area Between Curves
- X. Approximating Definite Integral as a Sum
- XI. Applications of Integration in Business and Economics, Including Consumers' Surplus
- XII. Multivariable Calculus
  - A. Introduction to functions of two or more variables
  - B. Partial differentiation
  - C. Applications

### **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.

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.

Writing  
0 - 0%

**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.

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. 11th ed. Lial, Margaret and Greenwell, Raymond and Ritchey, Nathan. Pearson. 2015

Calculus And Its Applications. 13th ed. Goldstein, Larry and Lay, David and Schneider, David. Pearson. 2013 (classic)