GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: MATH 1A DIVISION: 20 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2023 CURRICULUM APPROVAL DATE: 06/13/2023

SHORT TITLE: CALC/ANAL GEOM I

LONG TITLE: Single-Variable Calculus and Analytic Geometry

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
4	18	Lecture:	4	72
		Lab:	0	0
		Other:	0	0
		Total:	4	72

Out of Class Hrs:	144.00
Total Learning Hrs:	216.00

COURSE DESCRIPTION:

A first course in differential and integral calculus of a single variable covering limits and continuity, analyzing the behavior and graphs of functions, derivatives, implicit differentiation, higher order derivatives, related rates and optimization problems, Newton's Method, Fundamental Theorem of Calculus, and definite and indefinite integrals. (C-ID MATH 210) PREREQUISITE: Mathematics 8B or Mathematics 11 with a grade of 'C' or better, or high school Precalculus with a grade of 'B' or better completed within the last five years, or equivalent skills.

PREREQUISITES:

Completion of MATH 8B, as UG, with a grade of C or better.
OR
Completion of MATH 11, as UG, with a grade of C or better.
OR
Score of 28 on Pre-Calculus
OR
Score of 2900 on Accuplacer Math

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion

05 - Hybrid

71 - Dist. Ed Internet Simultaneous

72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Evaluate limits at infinity and at particular points using algebra, graphs, theorems, and limit laws.
2. Evaluate first-order and higher-order derivatives of functions using a variety of formulas and techniques (e.g. product rule, quotient rule, Chain rule, implicit differentiation, logarithmic differentiation).
3. Generate sketches of curves by applying the first and second derivative to determine local/ absolute extrema and concavity.
4. Explain and apply the Fundamental Theorem of Calculus and use it to evaluate definite integrals.

COURSE OBJECTIVES:

By the end of this course, a student should:

1. Explain and evaluate limits in general, at infinity, and at particular points. Do it algebraically, graphically and numerically, utilizing technology.
2. Define and interpret continuity through limits.
3. Use continuity to describe the behavior of a function and its differentiability.
4. Explain the concept of a derivative graphically, numerically, algebraically, and verbally.
5. Differentiate polynomial, exponential, logarithmic, rational, hyperbolic and trigonometric functions.
6. Perform implicit differentiation with applications and differentiate inverse functions.
7. Compute higher order derivatives.
8. Model and solve related rates and optimization problems.
9. Use derivatives in various applications including physics, economics, and optimization.
10. Apply the first and second derivatives in curve sketching.
11. Determine the applicability of L'Hospital's Rule and use it to evaluate limits.
12. Use technology to estimate roots using Newton's Method.
13. Use technology to evaluate the definite integral using the Right Hand, Left Hand, and Midpoint Rules.
14. Evaluate indefinite integrals by formulating antiderivatives.
15. Calculate Riemann sums.
16. Explain and apply the Fundamental Theorem of Calculus and use it to evaluate definite integrals.

COURSE CONTENT:

Curriculum Approval Date: 06/13/2023

16 HOURS

CONTENT: Review pre-calculus concepts such as elementary functions, asymptotes, factoring, domain/ range, and trigonometry. Discuss

the concept of a limit; evaluate limits numerically, graphically, and algebraically. Evaluate infinite limits. Define continuity.

24 HOURS:

CONTENT: Limit definition of derivative. Define derivatives graphically. Derivatives and rates of change and the derivative as a function. Derivatives of polynomial, exponential, trigonometric, logarithmic, and hyperbolic functions. Derivative rules including product rule, quotient rule, Chain rule, implicit differentiation, logarithmic differentiation. Compute higher order derivatives. Applications of the derivative, including rates of change, related rates, linear approximation, and differentials.

16 HOURS

CONTENT: Mean Value Theorem and Rolle's Theorem. The impact of derivatives on the shape of a graph; maximum and minimum values;

points of inflection; concavity; curve sketching; optimization. Indeterminate forms, L'Hospital's Rule. Newton's method (optional).

14 HOURS

CONTENT: Antiderivatives, areas, distances, and definite integrals. Use the Left, Right, and Midpoint Rules to find the area under a curve.

Riemann sums. The Fundamental Theorem of Calculus and indefinite integrals. Basic integration and the substitution rule.

2 HOURS

CONTENT: Final exam.

METHODS OF INSTRUCTION:

Instruction will follow a standard lecture/discussion format. Extensive homework will be assigned in order to assure mastery of the concepts covered in class. Students will also be required to utilize technology, such as calculators and/ or computer software, to enhance their understanding of the material.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours 144

Assignment Description

20 hours: Reading assigned text book section, reviewing textbook examples and class notes

100 hours: Doing assigned homework problems; group projects

20 hours: Studying for a test, reviewing problem-solving techniques

4 hours: Online discussions

METHODS OF EVALUATION:

Writing assignments
Evaluation Percent 5
Evaluation Description
Lab Reports; Projects; Research Papers; Discussions

Problem-solving assignments
Evaluation Percent 15
Evaluation Description
Homework Problems; Quizzes

Objective examinations
Evaluation Percent 80
Evaluation Description
Written exams

REPRESENTATIVE TEXTBOOKS:

James Stewart. Calculus: Early Transcendentals. 9th Edition Cengage,2021 or a comparable textbook/material.
Rationale: Latest edition of textbook
ISBN: ISBN: 978-1-337-61392-7
Reading Level of Text, Grade: 12 Verified by: Jennifer Nari

Other appropriate textbook as chosen by the instructor.

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
GAV B4, effective 200670
CSU GE:
CSU B4, effective 200670
IGETC:
IGETC 2A, effective 200670
CSU TRANSFER:
Transferable CSU, effective 200670
Not Transferable
UC TRANSFER:
Transferable UC, effective 200670
Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN: MATH18
CAN Sequence: MATH SEQ BC
CSU Crosswalk Course Department: MATH
CSU Crosswalk Course Number: 210
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000242538
Sports/Physical Education Course: N
Taxonomy of Program: 170100