MATH 190: CALCULUS WITH ANALYTIC GEOMETRY I

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2024
Credits:	5
Total Contact Hours:	90
Lecture Hours :	90
Lab Hours:	0
Hours Arranged:	0
Outside of Class Hours:	180
Total Student Learning Hours:	270
Prerequisite:	MATH 175 or direct placement based on multiple measures.
District General Education:	A3. Mathematics
Transferable to CSU:	Yes
Transferable to UC:	Yes - Approved
Grading Method:	Standard Letter, Pass/No Pass

Catalog Course Description

A first course in differential and integral calculus of a single variable: functions; limits and continuity; techniques and applications of differentiation and integration; Fundamental Theorem of Calculus. Primarily for science, technology, engineering & math majors. 90 lecture hours.

Course Objectives

- Compute the limit of a function at a real number.
- Determine if a function is continuous at a real number.
- Find the derivative of a function as a limit.
- Compute derivatives using differentiation formulas.
- Find the equation of a tangent line to a function.
- Use implicit differentiation.
- Use differentiation to solve applications such as related rate problems and optimization problems.
- Graph functions using methods of calculus.
- Evaluate integrals using the Fundamental Theorem of Calculus.
- Evaluate a definite integral as a limit.
- Use the definite integral to find areas and volumes.

Major Course Content

1. Definition and computation of limits using numerical, graphical, and algebraic approaches
2. Continuity and differentiability of functions
3. Derivative as a limit
4. Interpretation of the derivative as: slope of tangent line, a rate of change
5. Differentiation formulas: constants, power rule, product rule, quotient rule and chain rule
6. Derivatives of trigonometric functions
7. Implicit differentiation with applications, and differentiation of inverse functions
8. Higher-order derivatives
9. Graphing functions using first and second derivatives, concavity and asymptotes
10. Maximum and minimum values, and optimization
11. Mean Value Theorem
12. Antiderivatives and indefinite integrals
13. Applications of integration to areas and volumes
14. Definite integral; Riemann sum
15. Properties of the integral
16. Fundamental Theorem of Calculus
17. Integration by substitution

Examples of Outside Assignments

1. Given a function, students will compute the limit of the function at a real number using numerical, algebraic, or graphical methods.
2. Given a linear function, students will use the precise definition of a limit to prove the limit of the function at a specific value.
3. Given a function, students will use techniques of differentiation to compute the first derivative and higher order derivatives of the function.
4. Students will solve related rates problems by constructing equations that will be differentiated with respect to time.
5. Students will solve optimization problems by using the first derivative to find critical points and by testing these critical points using either the first or second derivative.
6. Students will use u-substitution techniques to integrate a given function. The function could be polynomial, trigonometric, inverse, exponential, or logarithmic.

Instruction Type(s)

Lecture, Online Education Lecture

IGETC Area 2: Mathematical Concepts and Quantitative Reasoning

Yes