MATH C180: CALCULUS 1

Item	Value
Curriculum Committee Approval Date	04/30/2020
Top Code	170100 - Mathematics, General
Units	5 Total Units
Hours	90 Total Hours (Lecture Hours 90)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Local General Education (GE)	• CL Option 1 Math Competency (CA3)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 2A Math Concepts (2A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 2A Math Concepts (2A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course Description

This is the first course in the calculus sequence. It satisfies the requirement for majors in mathematics, science, or engineering. Topics include limits, derivatives of algebraic and transcendental functions, applications of derivatives, indefinite integrals, definite integrals, the Fundamental Theorem of Calculus, and applications of integration. PREREQUISITE: MATH C120; or MATH C135 and MATH C170; or a high school class of either Integrated Math 4, Trigonometry, Precalculus or equivalent. Transfer Credit: CSU; UC: Credit Limitation: MATH C140 and MATH C180 combined: maximum credit, 1 course. C-ID: MATH 210.**C-ID:** MATH 210.

Course Level Student Learning Outcome(s)

1. Apply differential calculus and integration skills to solve problems involving maxima and minima, optimization.
2. Apply differential calculus and integration skills to solve problems involving areas bounded by a function and the coordinate axis.

Course Objectives

- 1. Apply differential calculus to solve optimization problems from the real world, algebraically and graphically.
- 2. Apply the integration skills to solve the real world situations involving area, volume, length of curves, surface of revolution, moments and centers of mass, and work, and fluid forces.
- 3. Solve application problems using differential calculus and calculate definite and indefinite integrals.
- 4. Use appropriate technology such as calculators or computer software to enhance mathematical thinking, visualization, and understanding, to solve mathematical problems, and judge the reasonableness of the results.
- 5. Demonstrate quantitative reasoning skills by developing convincing arguments and by communicating mathematically both verbally and in writing.
- 6. Determine if a function is continuous at a real number; and find the equation of a tangent line to a function.

Lecture Content

Definition and computation of limits using numerical, graphical, and algebraic approaches Continuity and differentiability of functions Derivative as a limit Interpretation of the derivative as: slope of tangent line, a rate of change Determine if a function is continuous at a real number Find the equation of a tangent line to a function Differentiation formulas: constants, power rule, product rule, quotient rule, and chain rule Derivatives of transcendental functions such as trigonometric, exponential, or logarithmic Implicit differentiation with applications, and differentiation of inverse functions Higher-order derivatives Graphing functions using first and second derivatives, concavity, and asymptotes Maximum and minimum values, and optimization Mean Value Theorem Antiderivatives and indefinite integrals Area under a curve Definite integral; Riemann sum Properties of the integral Fundamental Theorem of Calculus Integration by substitution Indeterminate forms and LHopitals Rule

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Video one-way (ITV, video) (63)
- Cable (CA)

Instructional Techniques

1. Deliver lectures of course content. 2. Assign homework and quizzes. 3. Relate material in the course to real life and the outside world. 4. Require participation including student-to-student and student-to-instructor interaction through the use of small-group activities and whole-class discussion. 5. Apply technologies to increase learner motivation such as Scientific and/or Graphing Calculator and computer software such as Wolfram

Reading Assignments

Alpha. 6. Objective Examinations 7. Midterm Exam (comprehensive) 8. Final Exam (comprehensive)

Writing Assignments

Read the textbook and supplementary materials and do homework.

Out-of-class Assignments

Read the textbook and supplementary materials.

Demonstration of Critical Thinking

Final Exam Midterm Exam Objective Examinations Problem Solving Exercises Projects (ind/group) Report Short Quizzes Skills Demonstration Written Assignments

Required Writing, Problem Solving, Skills Demonstration

Instructor may ask students to show metacognitive skills in class activities.

Eligible Disciplines

Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

Manuals Resources

1. Required Briggs, William; Cochran, Lyle; Gillett, Bernard. Calculus: Early Transcendentals, 3rd ed. Pearson, 2019