# Course Outline

**2026-2027 Catalog**

## MATH C2210 - Calculus I: Early Transcendentals

### Catalog Description

**Transfer Status:** CSU/UC

**Prerequisite:**

Pre-calculus, or college algebra and trigonometry, or equivalent, or placement as determined by the college's multiple measures assessment process.

**Unit(s):** 5.00

**Lecture:** 85.00 Contact hours/170.00 Out of class hours/255.00 Total hours/5.00 Unit(s)
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**Course Description:** A first course in differential and integral calculus of a single variable. Topics include limits and continuity of functions, techniques and applications of differentiation, an introduction to integration, and the Fundamental Theorem of Calculus. This course is primarily intended for Science, Technology, Engineering, and Mathematics (STEM) majors. (C-ID MATH 210).

### Objectives

Upon successful completion of this course, the student should be able to:

1. Compute the limit of a function and evaluate indeterminate forms using L'Hôpital's Rule.
2. Determine the continuity of a function.
3. Find the derivative of a function as a limit.
4. Find the equation of a tangent line to the graph of a function.
5. Compute derivatives using differentiation formulas.
6. Use differentiation to solve applications such as related rate problems and optimization problems.
7. Use implicit differentiation and find derivatives of transcendental functions.
8. Graph functions using methods of calculus.
9. Evaluate a definite integral as a limit.
10. Evaluate integrals using the Fundamental Theorem of Calculus.
11. Apply integration to find area.

### Course Content

**Topic Titles / Suggested Time Topic**

**Lecture**

| Topics | Lec Hrs |
|---|---|
| 1. Limits: intuitive and precise definitions; computation using numerical, graphical, and algebraic approaches | 85.00 |
| 2. Continuity and differentiability of functions | |
| 3. Derivative as a limit | |
| 4. Interpretation of derivatives as slopes of tangent lines and rates of change | |
| 5. Differentiation formulas: constants, power rule, product rule, quotient rule, and chain rule | |
| 6. Derivatives of transcendental functions including trigonometric, exponential, and logarithmic | |
| 7. Implicit differentiation, differentiation of inverse functions, including inverse trigonometric functions | |
| 8. Applications of differentiation, including related rates and optimization | |
| 9. Higher-order derivatives | |
| 10. Indeterminate forms and L'Hôpital's Rule | |
| 11. Maximum and minimum values, Extreme Value Theorem | |
| 12. Graphing functions using first and second derivatives, concavity, and asymptotes | |
| 13. Mean Value Theorem | |
| 14. Antiderivatives and indefinite integrals | |
| 15. Definite integrals as limits of Riemann sums | |
| 16. Interpretation of the integral as area under a curve and net change | |

| Topics | Lec Hrs |
|---|---|
| 17. Basic integration rules and properties of integrals | |
| 18. Fundamental Theorem of Calculus | |
| 19. Integration by substitution | |
| **Total Hours:** | **85.00** |

## Methods of Instruction

A. Collaborative Group Work
B. Discussion
C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
D. Lecture

## Methods of Evaluation

A. Students should demonstrate their mastery of the learning objectives and their ability to devise, organize, and present complete solutions to problems.

   Examples of potential methods of evaluation include, but are not limited to, exams, quizzes, homework, classwork, technology-based activities, laboratory work, projects, and research demonstrations.

   Methods of evaluation are at the discretion of local faculty.

## Examples of Assignments

**Reading Assignments**

1. Read the section in the textbook on The Derivative and be able to set up and evaluate the limit that represents the derivative of a given function.
2. Read the section in the textbook on Antiderivatives and Indefinite Integration and be able to use basic integration rules to find an indefinite integral.

**Writing Assignments**

1. Graph the functions y = x, y= |x|, and y = x^(1/3), compute the derivatives of each function at the point (0,0), and describe the differentiability of these functions at this point. Assume you are explaining this to a group of students hearing this for the first time and write a detailed explanation discussing your results and why they occurred.
2. If p(x) is a polynomial function, explain why p(x) has exactly one antiderivative whose graph contains the origin. Assume you are explaining this to a classmate having trouble and write a detailed explanation using a general polynomial as well as giving one specific example.

**Out-of-Class Assignments**

1. Review the section in the textbook on Basic Differentiation and solve the problems assigned by the instructor, showing all steps.
2. Review the section in the textbook on The Fundamental Theorem of Calculus and solve the problems assigned by the instructor, showing each step.

## Recommended Materials of Instruction

Briggs, W., et al. (2021). Calculus: Early Transcendentals. *Pearson, 3rd.* 9780134763644.
Hass, J., et al. (2023). Thomas' Calculus: Early Transcendentals. *Pearson, 15th.* 9780137728626.
Stewart, J., et al. (2021). Calculus: Single Variable Calculus Early Transcendentals. *Cengage, 9th.* 9780357022269.

**Zero Cost Textbook**

Strang, G., Herman, E., et al. (2025). Calculus Volume 1. (OER) OpenStax.https://openstax.org/details/books/calculus-volume-1/

**Other Learning Materials**

A college-level textbook designed for science, technology, engineering and math majors, and supporting the learning objectives of this course. Texts used by individual institutions and even individual sections will vary.

## Minimum Qualifications

Mathematics (Masters Required)

**Created/Revised by:** Bartsch, Kimberly
**Date:** 11/03/2025