

Course Overview: MAT 243

Course title: Calculus I with Technology
Pre-requisites: MAT 155/155P or Placement at this level (In the high school context, pre-calculus is an appropriate pre-requisite).
Number of credits: 4
Catalog course description: A first course in calculus with a focus on differential calculus. Topics include the study of limits, continuity, rates of change, the definition of the derivative, indeterminate forms, and techniques of differentiation of linear, polynomial, exponential, logarithmic, rational, and trigonometric functions. The course will include applications of the derivative to solve applied problems. Characteristics of functions such as intervals of increase or decrease, concavity, extrema, and end behavior will be studied as a means to describe, reason, interpret, and analyze relationships. The course concludes with an introduction of antiderivatives. Use of an approved graphing calculator is required throughout the course.
Required instructor qualifications: Master's degree in mathematics or a related field (e.g., Mathematics Education). Applicants with Master's in a scientific field will be considered if they have experience teaching math.
Course's audience and role in Eastern's curriculum: All Eastern students take a foundational Math course as part of our liberal arts core curriculum. This course fulfills that requirement for students placed at this level. This class is required for all students seeking a BA or a BS degree in Mathematics as well as for all Mathematics minors. It is also required for students who major in Data Science with concentrations in Math or Computer Science, students pursuing the BS degree in Biology, and students majoring in Computer Science or Biochemistry.
Learning outcomes: The topics covered in this course are standard across all sections. In the open access textbook referenced below, the relevant chapters are chapter 1-4 and the beginning of chapter 5. By the end of this course, students will be able to: <ul style="list-style-type: none">• Understand and calculate limits• Determine whether or not functions are continuous• Understand and calculate rates of change• Know and apply the definition of the derivative• Calculate derivatives using derivative rules• Understand and solve application problems• Use derivatives to describe characteristics of functions• Describe, reason, interpret, and analyze relationships• Understand the basics of antiderivatives• Use technology to graph functions, create tables, evaluate functions, factor and expand expressions, evaluate limits, differentiate, and solve equations

- Communicate ideas thoughtfully and clearly both in writing and orally
- Work cooperatively with classmates

Primary modes of instruction: Class meetings might include lectures as well as problem solving.

Primary modes of assessment: Grades for this course are calculated based on three exams (including a cumulative final) and students' homework assignments, with significantly more weight accorded to the exams.

Other notes for instructors: We recommend the open access textbook [*Calculus, Volume 1*](#), available via OpenStax.

Approved by the Department of Mathematical Sciences on 05/15/2025

Signature of department chair or faculty liaison: *Megan E. Heershan*

Core Topics: MAT 243- Calculus I with Technology

1. Derivatives
 - b) Definition; application to linear functions and simple quadratic functions.
 - b) Rules
 - k) Addition
 - ii) Product
 - iii) Quotient
 - iv) Chain Rule (tied to composition)
 - v) Implicit Differentiation
 - c) Specific Functions
- i) Polynomials
 - ii) Exponential, base e , $\ln(x)$ (introduce after chain rule)
- iii) $\sin(x)$, $\cos(x)$, $\tan(x)$, $\arctan(x)$ (introduce after chain rule)
 - k) Concept of limit (informal approach only)
 - a. From graphs or pictures
 - b. From tables
 - k) Applications
 - a. Motion
 - b. Max-Min Problems
 - c. Tangent to a curve

Technology Background on TI-89

Students should be able to do the following using a TI-89.

1. Graph functions
2. Evaluate functions; evaluate expressions such as rates of change
3. Create tables of values for functions
4. Factor and expand expressions
5. Symbolic differentiation
6. Solve equations
 - ii) for values of an unknown
 - ii) for a particular variable
7. Sum
8. Limits