

Course Overview: MAT 244

Course title: Calculus II with Technology
Pre-requisites: MAT 243
Number of credits: 4
Catalog course description: This is the second course in a three semester calculus sequence. MAT 244 focuses on two related topics: methods and applications of integration, and infinite series and representation of functions by power series. Topics in integration include Riemann sums, definite and indefinite integrals, the Fundamental Theorem of Calculus, applications to geometry (area, volume, arc length) and to real-life problems, and techniques of integration. The course concludes with the study of sequences and series, convergence tests, and power series representation of functions (Taylor series). 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: This class is required for all students seeking a BA or a BS degree in Mathematics as well as for all Mathematics minors.
Learning outcomes: This course includes an extensive list of learning outcomes, as displayed on the sample syllabus. Feel free to exercise discretion in how you phrase your course outcomes, provided that the course covers the same content as the sample syllabus does.
Primary modes of instruction: Class meetings might include lectures as well as problem solving.
Primary modes of assessment: Instructors can exercise some discretion in how they weight assignments. These assignments should include homework, quizzes, and tests (3, including the final), with the greatest weight assigned to the exams.
Other notes for instructors: We recommend the open access textbook <i>Calculus, Volume 2</i> , available via OpenStax.

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

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

Core Topics: MAT 244-Calculus II with Technology

1. Concept Development
 - a. Integration-use area under a curve for concept development
 - i. Left-hand sums (equal segments)
 - ii. Right-hand sums (equal segments)
 - iii. Average of right- and left-hand sums
 - b. Connect integration and differentiation.
 - c. Fundamental Theorem of Calculus

2. Techniques of Integration
 - a. Basic functions
 - i. Polynomial functions
 - ii. $\sin(x)$
 - iii. $\cos(x)$
 - iv. $\tan(x)$
 - v.
 - vi. $\ln(x)$
 - vii.
 - b. Substitution
 - c. Integration by Parts
 - d. Partial Fractions (very basic, e.g. $1/(\text{quadratic})$)

3. Improper Integrals
 - a. Very basic.
 - b. Normal density, presented as an example, integrates to one, no closed form for antiderivative.

4. Series
 - a. Taylor
 - b. Geometric
 - c. Power
 - d. Students should be familiar with series expansions for $\sin(x)$, $\cos(x)$, , and $\log(1+x)$.

5. Applications
 - a. Motion
 - b. Some application involving , related to biology, related to business.
 - c. Volumes of revolution—very basic examples

1. Assume students comfortable with techniques listed for MAT 243.
2. Symbolic integration.
3. Calculation of a definite integral
4. Taylor series expansion.