

Mathematics 251
Calculus I (4)
(Effective Fall 2020)

Prerequisite: Two units of high school algebra, one unit of high school geometry, one-half unit of high school trigonometry and appropriate mathematics placement result OR EITHER completion of Math 170 with a C or better OR Math 185 with a C or better.

Catalog Description: (Applies to the Math 251-252 sequence) Limits and continuity. Derivatives and integrals of polynomial, rational, exponential, logarithmic, trigonometric, and hyperbolic functions. Techniques of integration. Conics. Parametric and polar equations. Indeterminate forms and improper integrals. Infinite series, including Taylor series. Must be taken in sequence.

Notes:

1. This course requires the use of a graphing calculator. Computer algebra systems are prohibited.
2. Some instructors may require a computer supplement in addition to the course text.
3. All students in this course will take the Department of Mathematics and Statistics common final exam.

General Education: The faculty of UT Martin have included this as a general education course with the following course goal and student learning outcomes.

Curriculum Goals: The purpose of the Mathematics requirement is to teach students to organize, evaluate and solve problems using both abstract and quantitative approaches. Courses in this area will enable students to communicate using the language of mathematics.

Student Learning Outcomes:

- a. Students will use appropriate notation and vocabulary to communicate mathematics.
- b. Students will use symbolic and numerical methods to perform calculations.
- c. Students will solve problems with real-world applications.

Learning Outcomes for Major: This course addresses one or more of the student learning outcomes for the major.

Upon completion of his/her degree from the University of Tennessee at Martin with a major in mathematics, the graduate will be able to:

- i. apply mathematical concepts and principles to perform numerical and symbolic computations.
- ii. use technology appropriately to investigate and solve mathematical and statistical problems.
- iii. write clear and precise proofs.
- iv. communicate effectively in both written and oral form.
- v. demonstrate the ability to read and learn mathematics and/or statistics independently.

Teaching Objectives:

The student will:

1. Understand and apply the definitions and concepts of limit and continuity of functions.
2. Understand and apply the definition of derivative, Rolle's Theorem, and Mean Value Theorem.
3. Differentiate both explicitly and implicitly algebraic, trigonometric, logarithmic, and exponential functions.
4. Apply the basic differentiation rules to complex functions.
5. Use derivatives in applications such as approximations, Newton's Method, related rates, optimization, and L'Hopital's Rule.
6. Use derivatives to determine increasing-decreasing and concavity intervals for functions and use these results as an aid in curve sketching of these functions.
7. Use the Fundamental Theorem of Calculus in definite integral evaluation.
8. Integrate the basic functions including the use of basic substitution techniques.

Text(s):

Calculus: Volume 1 (1st Edition), OpenStax. ISBN: 978-1938168024 A free ebook is available by clicking [here](#).

Outline:

Chapter	Title (Sections)	Days
2	Limits (1-5)	8
3	Derivatives (1-9)	16
4	Applications of Derivatives (1-10)	15
5	Integration (1-7)	10
	One period tests	5
	Total days	<hr/> 54

Disability Services:

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