

Course Number: MATH 2554 Calculus I

Catalog Description

The first course in a three-semester sequence designed to provide comprehensive coverage of differential and integral calculus. Topics include limits and continuity, differentiation with applications, integration with applications, and basic differential equations.

Prerequisite

MATH 1204 and MATH 1213 OR MATH 1285 with grades of C or better, or appropriate placement scores.

Credit/Contact/Load Hours

4 credit hours, 4 contact hours, 4 load hours

Target Audience and Transfer

This course is designed for transfer students who are interested in technical or science based fields. It is the first in a sequence of three differential and integral calculus courses and transfers as such.

Student Learning Outcomes

A successful Calculus I student should be able to:

- 1) Analyze and evaluate limits (including infinite limits) graphically, numerically, and analytically
- 2) Analyze functions for continuity
- 3) Evaluate limits using L'Hopital's rules
- 4) Evaluate derivatives by the limit process
- 5) Memorize basic differentiation rules
- 6) Evaluate derivatives for algebraic, trigonometric, inverse trigonometric, exponential and logarithmic functions and combinations thereof using basic differentiation rules including the product, quotient and chain rules
- 7) Compute derivatives using implicit differentiation
- 8) Evaluate derivatives using logarithmic differentiation
- 9) Apply differentiation rules to evaluate tangent lines and rates of change
- 10) Solve related rate problems using differentiation
- 11) Use differentiation techniques to evaluate absolute extrema.
- 12) Apply differentiation techniques to find intervals of increasing, decreasing and concavity, relative extrema and points of inflection
- 13) Demonstrate knowledge of curve sketching
- 14) Apply differentiation techniques to solve optimization problems.
- 15) Memorize basic integration rules
- 16) Evaluate integrals and areas using the limit definition of definite integrals
- 17) Evaluate definite integrals using the Fundamental Theorem of Calculus
- 18) Evaluate definite and indefinite integrals using substitution

The Departmental Calculus I Review Sheet contains problems that address the Student Learning Outcomes. Homework problems should be assigned which support the questions on the Review Sheet. In addition, the questions on the Review Sheet will be the guide for writing the end-of-semester assessment problems

Required Text:

Calculus, Early Transcendental Functions, Second Edition
By Briggs, Cochran and Gillett. Publisher: Addison Wesley, 2015

Required Topics:

<u>Section</u>	<u>Topic</u>
2.1	The idea of Limits
2.2	Definitions of Limits
2.3	Techniques for Computing Limits

2.4	Infinite Limits
2.5	Limits at Infinity
2.6	Continuity
3.1	Introducing the Derivative
3.2	Working with the Derivative
3.3	Rules of Differentiation
3.4	The Product and Quotient Rules
3.5	Derivatives of Trigonometric Functions
3.6	Derivatives as Rates of Change
3.7	The Chain Rule
3.8	Implicit Differentiation
3.9	Derivatives of Logarithmic and Exponential Functions
3.10	Derivatives of Inverse Trigonometric Functions
3.11	Related Rates
4.1	Maxima and Minima
4.2	What Derivatives Tell Us
4.3	Graphing Functions
4.4	Optimizing Problems
4.5	Linear Approximations and Differentials
4.6	Mean Value Theorem
4.7	L'Hopital's Rules
4.9	Antiderivatives
5.1	Approximating Area under Curves
5.2	Definite Integrals
5.3	Fundamental Theorem of Calculus
5.4	Working with Integrals
5.5	Substitution Rule

Optional Sections 1.1, 1.2, 1.3, 1.4, 2.7, 4.8

Required Instructional Activities

The content of the course may be taught with or without the use of a calculator as indicated by the instructor in his or her syllabus. Please note that no formula sheets or outside resources of any kind will be allowed for use on the final, with the exception, perhaps of the summation formulas used for calculating areas under curves and a calculator. Graphing calculators may or may not be allowed at the discretion of the instructor. For those classes in which graphing calculators are allowed, no credit should be awarded for numerical differentiation and integration or graphing questions without appropriate supporting work. As per departmental policy, no TI-89, TI-Nspire or any other model or brand of calculator containing a CAS will be allowed for use on the final exam.

Instructor Resources

Instructor's Guide and Test Bank
 Instructor's Solutions Manual
 Technology Manual
 MathXL
 MyMathLab
 TestGen
 Video Lectures (Available only through MML and MathXL)
 Power Point Lecture Slides

Student Resources

Student Solutions Manual
 Just-in-time Algebra and Trigonometry for Early Transcendentals Calculus, Fourth Edition
 MathXL
 MyMathLab
 Video Lecture (Available only with a MML course)