U3600-114 Calculus I

Course Format: Online

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Course credits: 4

Prerequisites: Completion of a college-level precalculus mathematics course with a C or better or the equivalent, or completion of U3600-109 Algebra for Calculus or similar college algebra course and a trigonometry course with a C or better or the equivalent, or four-years of above-average work in college-prep mathematics, including one semester of trigonometry.

Course Level: Intermediate

Course Description: This course will cover limits, theory, and application of the derivative; introduction to integration. After completing this course, the student will be able to: Evaluate limits and explain the relationship between continuity, limits, and derivatives; Use the definition of a derivative and the product, quotient, and chain rules to find derivatives; Use the Fundamental Theorem of Calculus and the substitution rule to compute integrals; Solve applied problems by setting up and evaluating derivatives and integrals.

Required Course Materials

- Strang, G., & Herman, E. "Jed." (2016). *Calculus Volume 1*. Houston, Texams: OpenStax.
- Your Textbook for this class is available for free online. You can get a copy here: www.openstax.org/details/calculus-volume-1
    - You can also purchase a print version, if you prefer, from OpenStax on Amazon.com. You can use whichever formats you want. Web view is recommended -- the responsive design works seamlessly on any device. If you buy on Amazon, make sure you use the link on your book page on openstax.org so you get the official OpenStax print version.
      (Simple printouts sold by third parties on Amazon are not verifiable and not as high-quality.)
      Calculus Volume 1 from OpenStax, Print ISBN 193816802X, Digital ISBN 1947172131

Optional/Recommended Course Materials

- A graphing calculator, such as a TI-83 or TI-84, is recommended.
- They are no additional or recommended course materials beyond those provided in the links found throughout the course. However, you are actively encouraged to use any resources you find on the internet or in your library to supplement your learning.

Hardware Requirements

- You will need a webcam, speakers, and a microphone. You will complete your exams through an online proctor, requiring all three components. You will need speakers or headphones to listen to video lectures.
- You will also need to submit written work while completing your exams. You will need a scanner or a camera to upload your written work.

Course Learning Objectives

By the end of this course, students will be able to

- Evaluate limits and explain the relationship between continuity, limits, and derivatives.
- Use the definition of a derivative and the product, quotient, and chain rules to find derivatives.

- Use the Fundamental Theorem of Calculus and the substitution rule to compute integrals.
- Solve applied problems by setting up and evaluating derivatives and integrals.

Course Overview

TOPIC	EVALUATED ACTIVITIES
Unit 1: Limits	
Limits, Rates of Change, and Tangent Lines	• WeBWork Homework
Limits: A Numerical and Graphical Approach	• WeBWork Homework
Basic Limit Laws	• WeBWork Homework
Limits and Continuity	• WeBWork Homework
Evaluating Limits Algebraically	• WeBWork Homework
Trigonometric Limits	• WeBWork Homework
Limits at Infinity	• WeBWork Homework
Intermediate Value Theorem	• WeBWork Homework
The Formal Definition of a Limit	• WeBWork Homework
Unit Test	• Test 1 – Multiple Choice • Test 1 – Open-ended Problems
Unit 2: Differentiation	
Definition of the Derivative	• WeBWork Homework
The Derivative as a Function	• WeBWork Homework
Product and Quotient Rules	• WeBWork Homework
Rates of Change	• WeBWork Homework
Higher Derivatives & Trigonometric Functions	• WeBWork Homework
The Chain Rule	• WeBWork Homework
Implicit Differentiation	• WeBWork Homework
Derivatives of General Exponential and Logarithmic Functions	• WeBWork Homework
Related Rates	• WeBWork Homework
Unit Test	• Test 2 – Multiple Choice • Test 2 – Open-ended Problems
Unit 3: Applications of the Derivative	
Linear Approximation and Applications	• WeBWork Homework
Extreme Values	• WeBWork Homework
The Mean Value Theorem and Monotonicity	• WeBWork Homework
The Shape of a Graph	• WeBWork Homework
L'Hopital's Rule	• WeBWork Homework
Graph Sketching and Asymptotes	• WeBWork Homework
Applied Optimization	• WeBWork Homework
Unit Test	• Test 3 – Multiple Choice • Test 3 – Open-ended Problems
Unit 4: The Integral	
Approximating and Computing Area	• WeBWork Homework
The Definite Integral	• WeBWork Homework
The Indefinite Integral	• WeBWork Homework

The Fundamental Theorem of Calculus, Part I & II	• WeBWork Homework
Net Change as the Integral of a Rate	• WeBWork Homework
Substitution Method	• WeBWork Homework
Further Transcendental Functions	• WeBWork Homework
Unit Test	• Test 4 – Multiple Choice • Test 4 – Open-ended Problems
Unit 5: Applications of the Integral	
Area Between Two Curves	• WeBWork Homework
Setting Up Integrals: Volume, Density, Average Value	• WeBWork Homework
Volumes of Revolution	• WeBWork Homework
The Method of Cylindrical Shells	• WeBWork Homework
Work and Energy	• WeBWork Homework
Final Exam	• Final Exam – Multiple Choice • Final Exam – Open-ended Problems

Evaluation Methods
Your final grade will be based on your performance on the following:
WeBWork Homework = 15% of grade
Tests = 60% of grade (15% each)
Final Exam = 25% of grade

WeBWork Homework (15%)
Your homework will be done using WeBWork. The links for WebWork assignments are given within the individual topic sections in the online course. You may rework the homework problems as many times as you wish. Your instructor will enter your scores from the homework assignments for a section into the online course when you notify them that you are ready to take the exam on that section.

Tests 1, 2, 3, and 4 (60% total; 15% each)
The tests are cumulative, but each test will emphasize material from the most recent section. There is a multiple choice test which consists of 10 multiple-choice questions. An open-ended test with 4 open-ended questions. Students have 30 minutes to take each test and may use a calculator and note pages to record their work. No notecards, other scratch paper, mobile devices or searching of the Internet is permitted. Students may request to take a second, proctored, attempt on the multiple-choice questions portion only and will have 30 minutes for their second attempt.

Final exam (25%)
Final Exam consists of 14 multiple choice and 6 open-ended questions. It is cumulative. Students have 2 hrs to complete the final exam and may use a calculator, final exam notecard, and note pages to record their work. No scratch paper, mobile devices or searching of the Internet is permitted.

Exam Method: Online with Proctoring
This course requires all students to complete all tests, including retakes, and the final exam online with a proctoring service. Students receive two attempts on each Test - multiple choice part. If you elect to make a second attempt, the highest score of either attempt will be recorded.

Grading Scale

The following grading scale is used to evaluate all course requirements and determine your final grade. Grades will always be rounded up to the nearest tenth.

A = 93–100	B = 83–87.9	C = 70–77.9	D = 60–69.9
AB = 88–92.9	BC = 78–82.9		F = Below 60

Pass/Fail Option

Students who enroll in an Independent Learning course under the pass/fail option will receive a final grade of S in place of a final grade equivalent to an A, AB, B, BC, or C and a final grade of U in place of a final grade equivalent to a D or F.