

U3600-216 Calculus III

Course Format: Online

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Course credits: 4

Prerequisites: Completion of U3600-215 Calculus II with a C or better or the equivalent

Course Description: Introduction to functions of several variables, including partial derivatives, multiple integrals, the calculus of vector-valued functions, and Green's Theorem, Stokes' Theorem, and the Divergence Theorem.

Required Course Materials

Textbook: Strang, G., & Herman, E. "Jed." (2016). *Calculus Volume 3*. Houston, Texas: OpenStax.

- Your textbook for this class is available for free online. You can get a copy here: openstax.org/details/calculus-volume-3 (Links to an external site.).
 - You can also purchase a print version if you prefer from OpenStax on Amazon.com. You can use whichever format you would like. Web view is recommended—the responsive design works seamlessly on any device. If you buy the textbook 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 are not as high quality.
 - *Calculus Volume 3* from OpenStax: Hardcover: ISBN-10: 1-938168-07-0 ISBN-13: 978-1-938168-07-9 Paperback: ISBN-13: 978-1-50669-805-2 Digital: ISBN-10: 1-947172-16-6 ISBN-13: 978-1-947172-16-6

Optional/Recommended Course Materials

- A graphing calculator, such as a TI-83 or TI-84, is recommended.
- There are no additional or recommended course materials beyond those provided in the links found throughout the courses. 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

- Visualize and analyze curves and surfaces defined by parametric equations, polar coordinates, and vectors.

- Compute derivatives and integrals of multivariate functions.
- Use Green's Theorem, Stokes' Theorem, and the Divergence Theorem to evaluate line and surface integrals.
- Solve applied problems by setting up and evaluating derivatives and integrals of multivariate functions.

Course Overview

TOPIC	EVALUATED ACTIVITIES
Unit 1: Parametric Equations, Polar Coordinates, Vector Geometry	
Parametric Equations	• WeBWork Homework
Arc Length and Speed	• WeBWork Homework
Polar Coordinates	• WeBWork Homework
Area and Arc Length in Polar Coordinates	• WeBWork Homework
Conic Sections	• WeBWork Homework
Vectors in the Plane and in Three Dimensions	• WeBWork Homework
Dot Product and the Angle Between Two Vectors	• WeBWork Homework
The Cross Product	• WeBWork Homework
Planes in 3-Space	• WeBWork Homework
A Survey of Quadric Surfaces	• WeBWork Homework
Cylindrical and Spherical Coordinates	• WeBWork Homework
Unit Test	• Test 1 – Multiple Choice (2 attempts) • Test 1 – Open-ended Problems
Vector-Valued Functions	• WeBWork Homework
Calculus of Vector-Valued Functions, Arc Length and Speed	• WeBWork Homework
Functions of Two or More Variables	• WeBWork Homework
Limits and Continuity in Several Variables	• WeBWork Homework
Partial Derivatives	• WeBWork Homework
T-Differentiability and Tangent Planes	• WeBWork Homework
The Gradient and Directional Derivatives	• WeBWork Homework
The Chain Rule	• WeBWork Homework
Maximum and Minimum Values	• WeBWork Homework
Lagrange Multipliers	• WeBWork Homework
Unit Test	• Test 2 – Multiple Choice (2 attempts) • Test 2 – Open-ended Problems

Integration in Two Variables	<ul style="list-style-type: none"> • WeBWork Homework
Double Integrals Over More General Regions	<ul style="list-style-type: none"> • WeBWork Homework
Triple Integrals	<ul style="list-style-type: none"> • WeBWork Homework
Integration in Polar, Cylindrical, and Spherical Coordinates	<ul style="list-style-type: none"> • WeBWork Homework
Applications of Multiple Integrals	<ul style="list-style-type: none"> • WeBWork Homework
Change of Variables	<ul style="list-style-type: none"> • WeBWork Homework
Unit Test	<ul style="list-style-type: none"> • Test 3 – Multiple Choice (2 attempts) • Test 3 – Open-ended Problems
Vector Fields	<ul style="list-style-type: none"> • WeBWork Homework
Line Integrals	<ul style="list-style-type: none"> • WeBWork Homework
Conservative Vector Fields	<ul style="list-style-type: none"> • WeBWork Homework
Parametric Surfaces, Surface Integrals, and Surface Integrals of Vector Fields	<ul style="list-style-type: none"> • WeBWork Homework
Green's Theorem	<ul style="list-style-type: none"> • WeBWork Homework
Stokes' Theorem	<ul style="list-style-type: none"> • WeBWork Homework
The Divergence Theorem	<ul style="list-style-type: none"> • WeBWork Homework
Unit Test	<ul style="list-style-type: none"> • Test 4 – Multiple Choice (2 attempts) • Test 4 – Open-ended Problems
Final Exam	<ul style="list-style-type: none"> • Final Exam – Multiple Choice • Final Exam – Open-ended Problems

Evaluation Methods

Your final grade will be based on your performance on the following:

1. WeBWork Homework = 15% of grade
2. Test = 60% of grade (15% each)
3. 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 before you take that unit's exam.

Test 1, 2, 3, and 4 (60%)

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 60 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 60 minutes for their second attempt.

Final Exam (25%)

The Final Exam consists of 10 multiple choice questions and 8 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 = 83–87.99	C = 70–77.99	D = 60–69.99
AB = 88–92.99	BC = 78–82.99		F = Below 60

Pass/Fail Option

Students who enroll in an Independent Learning (IL) 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.