

U3600-216 Calculus III

Course Format: Online

Course Author/s: Abra Brisbin, Ph.D.; Carolyn Otto, Ph.D.

Course credits: 4

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

Intermediate: Appropriate for second-year or higher college students

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

- Rogawski, J. & Adams, C. (2015) Calculus, Early Transcendentals (3rd ed.). W. H. Freeman. (ISBN-13: 978-1464114885; ISBN-10: 1464114889).

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 #	TOPIC	EVALUATED ACTIVITIES
Unit 1: Parametric Equations, Polar Coordinates, Vector Geometry		
11.1	Parametric Equations	• WeBWork Homework
11.2	Arc Length and Speed	• WeBWork Homework
11.3	Polar Coordinates	• WeBWork Homework

11.4	Area and Arc Length in Polar Coordinates	<ul style="list-style-type: none"> • WeBWork Homework
11.5	Conic Sections	<ul style="list-style-type: none"> • WeBWork Homework
12.1 & 12.2	Vectors in the Plane and in Three Dimensions	<ul style="list-style-type: none"> • WeBWork Homework
12.3	Dot Product and the Angle Between Two Vectors	<ul style="list-style-type: none"> • WeBWork Homework
12.4	The Cross Product	<ul style="list-style-type: none"> • WeBWork Homework
12.5	Planes in 3-Space	<ul style="list-style-type: none"> • WeBWork Homework
12.6	A Survey of Quadric Surfaces	<ul style="list-style-type: none"> • WeBWork Homework
12.7	Cylindrical and Spherical Coordinates	<ul style="list-style-type: none"> • WeBWork Homework
	Unit Test	<ul style="list-style-type: none"> • Test 1 – Multiple Choice • Test 1 – Open-ended Problems
Unit 2: Calculus of Vector-Valued Functions, Differentiation in Several Variables		
13.1	Vector-Valued Functions	<ul style="list-style-type: none"> • WeBWork Homework
13.2 & 13.3	Calculus of Vector-Valued Functions, Arc Length and Speed	<ul style="list-style-type: none"> • WeBWork Homework
14.1	Functions of Two or More Variables	<ul style="list-style-type: none"> • WeBWork Homework
14.2	Limits and Continuity in Several Variables	<ul style="list-style-type: none"> • WeBWork Homework
14.3	Partial Derivatives	<ul style="list-style-type: none"> • WeBWork Homework
14.4	T-Differentiability and Tangent Planes	<ul style="list-style-type: none"> • WeBWork Homework
14.5	The Gradient and Directional Derivatives	<ul style="list-style-type: none"> • WeBWork Homework
14.6	The Chain Rule	<ul style="list-style-type: none"> • WeBWork Homework
14.7	Maximum and Minimum Values	<ul style="list-style-type: none"> • WeBWork Homework
14.8	Lagrange Multipliers	<ul style="list-style-type: none"> • WeBWork Homework
	Unit Test	<ul style="list-style-type: none"> • Test 2 – Multiple Choice • Test 2 – Open-ended Problems
Unit 3: Multiple Integration		
15.1	Integration in Two Variables	<ul style="list-style-type: none"> • WeBWork Homework
15.2	Double Integrals Over More General Regions	<ul style="list-style-type: none"> • WeBWork Homework
15.3	Triple Integrals	<ul style="list-style-type: none"> • WeBWork Homework
15.4	Integration in Polar, Cylindrical, and Spherical Coordinates	<ul style="list-style-type: none"> • WeBWork Homework
15.5	Applications of Multiple Integrals	<ul style="list-style-type: none"> • WeBWork Homework
15.6	Change of Variables	<ul style="list-style-type: none"> • WeBWork Homework
	Unit Test	<ul style="list-style-type: none"> • Test 3 – Multiple Choice • Test 3 – Open-ended Problems
Unit 4: Line and Surface Integrals, Fundamental Theorems of Vector Analysis		
16.1	Vector Fields	<ul style="list-style-type: none"> • WeBWork Homework
16.2	Line Integrals	<ul style="list-style-type: none"> • WeBWork Homework
16.3	Conservative Vector Fields	<ul style="list-style-type: none"> • WeBWork Homework
16.4 & 16.5	Parametric Surfaces, Surface Integrals, and Surface Integrals of Vector Fields	<ul style="list-style-type: none"> • WeBWork Homework
17.1	Green's Theorem	<ul style="list-style-type: none"> • WeBWork Homework
17.2	Stokes' Theorem	<ul style="list-style-type: none"> • WeBWork Homework
17.3	The Divergence Theorem	<ul style="list-style-type: none"> • WeBWork Homework
	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 (20% 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. 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.

Test 1, 2, 3 (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 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%)

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.