



MATH 221: Calculus III

Course Information:

Semester	: May 30, 2022 – July 1, 2022
Credit	: 4
Teaching Hours	: 50 Hours
Location	: Online
Professor	: Wanchunzi Yu
Email	: wyu@bridgew.edu

Course Description

This course is an introduction to the calculus of functions of several real variables. Topics include polar and parametric equations, vectors and vector-valued functions, and differentiation/integration of multivariable functions, multiple integration, linear and surface integrals, Green's theorem, Stokes' theorem, and divergence theorem.

Prerequisites

The prerequisite for this course is MATH 220 Calculus II with a minimum grade of C or higher. It is crucial that students are comfortable with the standard functions from single variable calculus and with the basic rules of differentiation and techniques of integration.

Textbook

Calculus – Early Transcendentals (with WebAssign), 8th edition, by James Stewart. Students must purchase access to WebAssign, but a hard copy of the text is **optional**. Access to WebAssign includes access to an electronic version of the textbook.

Course Outcomes

Upon successful completion of this course, students will be conversant with

- parametric and polar equations
- applying calculus concepts to equations defined with different parametrizations
- vectors and vector-valued functions and the applications of other calculus topics
- functions of several variables
- understanding of line and surface integrals and the relations between each other via the fundamental theorems of vector analysis

Course Topics and Tentative Schedule

We will cover most of the material from the following chapters of the course text (Ch10, Ch12-Ch17).

Week 1.



- Ch. 10.1: Curves Defined by Parametric Equations
- Ch. 10.2: Calculus with Parametric Curves
- Ch. 10.3: Polar Coordinates
- Ch. 10.4: Area and Arc Length in Polar Coordinates
- Ch. 12.1: Three-Dimensional Coordinate Systems
- Ch. 12.2: Vectors
- Ch. 12.3: The Dot Product
- Ch. 12.4: The Cross Product
- Ch. 12.5: Equations of Lines and Planes
- Ch. 12.6: Cylinders and Quadric Surfaces

Week 2

- Ch. 13.1: Vector Functions and Space Curves
- Ch. 13.2: Derivatives and Integrals of Vector Functions
- Ch. 13.3: Arc Length and Curvature
- Ch. 13.4: Motion in Space – Velocity and Acceleration
- Ch. 14.1 Functions of Several Variables
- Ch. 14.2 Limits and Continuity
- Ch. 14.3 Partial Derivatives
- Ch. 14.4 Tangent Planes and Linear Approximations
- Ch. 14.5 The Chain Rule

Week 3.

- Ch. 14.6 Directional Derivatives and the Gradient Vector
- Ch. 14.7 Maximum and Minimum Values
- Ch. 14.8 Lagrange Multipliers
- Ch. 15.1 Double Integrals over Rectangles
- Ch. 15.2 Double Integrals over General Regions
- Ch. 15.3 Double Integrals in Polar Coordinates
- Ch. 15.4 Applications of Double Integrals

Week 4.

- Ch. 15.4 Surface Area
- Ch. 15.5 Triple Integrals
- Ch. 15.7 Triple Integrals in Cylindrical Coordinates
- Ch. 15.8 Triple Integrals in Spherical Coordinates
- Ch. 16.1 Vector Fields
- Ch. 16.2 Line Integrals
- Ch. 16.3 The Fundamental Theorem for Line Integrals



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Week 5.

- Ch. 16.4 Green's Theorem
- Ch. 16.5 Curl and Divergence
- Ch. 16.6 Parametric Surfaces and Their Areas
- Ch. 16.7 Surface Integrals
- Ch. 16.8 Stokes' Theorem
- Ch. 16.9 The Divergence Theorems

Canvas

Course content (e.g. syllabus, notes, homework assignments) will be uploaded to [Canvas](#). Make sure to check it regularly for updates.

Homework

Homework problems are online, we will use the online resource WebAssign for weekly homework assignments and supplemental materials. Make sure to select the correct course, please refer to Achieve Instruction on the Canvas for more details. NO LATE HOMEWORK WILL BE ACCEPTED.

Attendance

Attendance for the course will be the Watch It/Lecture videos with questions on WebAssign. For each section, videos with questions are available on WebAssign. Please complete the Watch It/Lecture videos to receive the full attendance credits.

Midterm Exam

You will take 1 mid-term exam on Canvas during the semester. Exam is given online, time will be limited to class time (75 minutes). The exam will involve a mix of mechanical skills and conceptual reasoning. The best possible preparation for them is regular attendance and completion of assigned homework. Make-up exams are only given in case of documented emergencies.

Final Exam

The final exam will also take place online on Canvas.

Points Allocation

Your final course grade will be determined by

Homework: 30%

Attendance: 20%

Midterm Exam: 20%

Final Exam: 30%

Grading Scale



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Letter grades will be assigned as follows:

A	93-100	C	73-76
A-	90-92	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	below 60

* This syllabus may be amended during the semester.