

Lecture: (Section 04) Monday-Wednesday-Thursday, 1:35pm–2:40pm, online via Zoom.
(Section 12) Monday-Wednesday-Thursday, 4:35pm–5:40pm, online via Zoom.
All lectures are recorded for later playback.

Instructor: Evan Dummit (he/him/his), edummit@northeastern.edu.

Office Hours: Wednesday 3pm-4:15pm, Thursday 12:15pm-1:15pm, or by appointment, online via Zoom.

Course Webpage: https://web.northeastern.edu/dummit/teaching_sp21_2321.html.

Course Textbook: The instructor will write lecture notes for the course (in lieu of an official textbook) as the semester progresses. The course will generally follow the presentation in “Worldwide Multivariable Calculus” by D. Massey, but it is not necessary to purchase the book for this course. (Essentially all calculus books cover the same material in the same way.)

Course Topics: This course is an introduction to multivariable calculus. Specifically, the course covers functions of multiple variables, vectors, dot and cross products, lines and planes in 3-space, parametrization of curves and surfaces, partial derivatives, directional derivatives and gradients, tangent lines and planes, the chain rule, linearization, minima and maxima, optimization, Lagrange multipliers, double and triple integrals in rectangular/polar/cylindrical/spherical coordinates, applications of multivariable integration, line and surface integrals, work, circulation, flux, conservative vector fields, the fundamental theorem of line integrals, Green's theorem, divergence and curl, Stokes's theorem, Gauss's divergence theorem, and applications of vector calculus.

Success in this course will require facility with the basic concepts and with computational applications.

Grades: Your course grade consists of **16% WeBWorK/Quizzes** and **84% exams**.

There are four exams (three midterms and a final): each 1-hour midterm contributes 18% of your grade, while the 2-hour final contributes 30%. The final exam can replace up to half of a low midterm grade.

The homework score consists of your total WeBWorK points divided by the total number of WeBWorK problems assigned.

An overall raw score of 92% will be **at least** an A, 90% will be **at least** an A-, 88% will be **at least** a B+, 82% will be **at least** a B, 80% will be **at least** a B-, 78% will be **at least** a C+, 70% will be **at least** a C, 68% will be **at least** a C-, and 60% will be **at least** a D.

If you feel that an assignment or exam has been misgraded, please talk to the instructor directly. Requests for regrading will not be considered more than two days past the date the assignment or exam was returned.

Exams: There will be three 1-hour midterm exams, each contributing 18% of the total course grade, along with a 2-hour common final exam, contributing 30% of the total course grade.

If you miss an exam for any reason, you will receive a 0; make-up exams will not be given.

The midterms are scheduled for Friday February 19th, Friday March 19th, and Tuesday April 13th. Exams will be conducted via Canvas and will approximate the in-class exam procedure. To accommodate flexible schedules, at least 3 different testing times will be available for each midterm exam. The final exam will occur during the final exam week (Apr 23-30).

Homework Assignments: Homework assignments will be assigned weekly via WeBWorK and due at 5am, typically on Thursdays. WeBWorK is an electronic homework-assessment system that is free for students and has been designed specifically for courses in mathematics.

It is highly recommended to start work on the assignments early, because some problems are quite lengthy. Many students like to work on the problems as soon as the corresponding material is covered in lecture. Do not fall into the trap of only starting the assignment the evening before it is due!

All problems on all assignments will be counted (no assignments or problems will be dropped), so you should do as much as you can on each assignment even if you cannot completely finish it.

You are allowed **THREE** 24-hour extensions on WeBWorK assignments during the semester. To claim an extension on a set, email the instructor within 24 hours of the due date requesting to use your extension (the 24-hour extension applies to the original due date, not to the time you request the extension) as follows: “I would like to use a 24-hour extension on Set #”. You need not give any reason for requesting an extension.

Additional extensions will not be granted under any circumstances.

Course Schedule: The course and lecture notes are tentatively organized into four chapters, as follows:

Weeks 1-2: Chapter 1 ~ Vectors and 3D Coordinates: Functions of several variables, 3d graphing, vectors, dot and cross products, lines and planes in 3-space, vector-valued functions, curves and motion in 3-space.

Weeks 3-5: Chapter 2 ~ Partial Derivatives: Limits and continuity, partial derivatives, directional derivatives, gradients, tangent planes, the chain rule, linearization, critical points, minima / maxima / saddle points, applied optimization, Lagrange multipliers.

Week 5: Midterm 1, covers chapters 1-2.

Weeks 6-8: Chapter 3 ~ Multiple Integration: Double integrals in rectangular and polar coordinates, triple integrals in rectangular coordinates, changes of variable in multiple integrals, triple integrals in cylindrical and spherical coordinates, applications of multiple integration

Week 9: Midterm 2, covers chapters 2-3.

Weeks 9-13: Chapter 4 ~ Vector Calculus: Line integrals, surfaces and surface integrals, vector fields, work, circulation, flux, conservative vector fields and potential functions, Green's theorem, divergence and curl, Gauss's divergence theorem, Stokes's theorem, applications.

Week 13: Midterm 3, covers chapter 4.

Week 15: Final exam, covers chapters 1-4.

Collaboration/Technology Policy: You are free to use calculators and computer technology for homework problems, and calculators are allowed on exams **provided that they are not capable of symbolic algebra.**

Mathematics is fundamentally a collaborative endeavor, and discussing the course material with others is an excellent way to solidify your own understanding. In particular, you are allowed to work on, and discuss, homework assignments together, as long as the actual submissions are your own work.

A warning: it is critical not to outsource your learning! You cannot expect to retain knowledge if you do not solve your homework problems yourself, whether because you relied on other people to explain to you how to do the problems, or because you relied too heavily on technological assistance.

Do note: 84% of your course grade is determined by the exams, on which collaboration is not allowed!

Attendance Policy: It is expected that you will attend every class. This course moves very fast, and it is quite possible to fall behind even if you only miss one day. If you miss class for any reason, it is highly advisable to consult the course lecture notes and to watch the recording of the lecture you missed. It is your responsibility to be aware of all information announced in class, including modifications to the course syllabus or schedule, even if you are absent.

If you will be absent from a class activity due to a religious observance or practice, or for participation in a university-sanctioned event (e.g., university athletics), it is your responsibility to inform the instructor during the first week of class and provide appropriate documentation if required.

Statement on Academic Integrity: A commitment to the principles of academic integrity is essential to the mission of Northeastern University. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University. Violations of academic integrity include (but are not limited to) cheating on assignments or exams, fabrication or misrepresentation of data or other work, plagiarism, unauthorized collaboration, and facilitation of others' dishonesty. Possible sanctions include (but are not limited to) warnings, grade penalties, course failure, suspension, and expulsion.

Statement on Accommodations: Any student with a disability is encouraged to meet with or otherwise contact the instructor during the first week of classes to discuss accommodations. The student must bring a current Memorandum of Accommodations from the Office of Student Disability Services.

Statement on Classroom Behavior: Disruptive classroom behavior will not be tolerated.

In general, any behavior that impedes the ability of your fellow students to learn will be viewed as disruptive. Examples of disruptive behavior include, but are not limited to, ringing cell phones, listening to an audio player during class, constant talking, eating food noisily, or laptop usage (except for note-taking), and any other disruptions of the course lectures.

Statement on Inclusivity: Faculty are encouraged to address students by their preferred name and gender pronoun. If you would like to be addressed using a specific name or pronoun, please let your instructor know.

Statement on Evaluations: Students are requested to complete the TRACE evaluations at the end of the course.

Miscellaneous Disclaimer: The instructor reserves the right to change course policies, including the evaluation scheme of the course. Notice will be given in the event of any substantial changes.