MATH 2321 Section 2, Spring 2026 Syllabus

Course Title: Calculus 3 for Science and Engineering

Time/Location: MWR, 9:15 – 10:20am, Snell Library 111

Office Hours: M: 12 – 1pm; W: 12 – 1pm; R: 10:30 – 11:30am, Richards Hall 115A

Instructor: Vance Blankers, `v.blankers@northeastern.edu`

Recitation Sessions: W: 2:50 – 4:20pm, Kariotis Hall 304

TA: Erinda Shyta, `shyta.e@northeastern.edu`

TA's Office Hours: W 12:30 – 1:30pm, Nightingale 541

Textbook: *Worldwide Multivariable Calculus*, by David B. Massey

- The PDF of the textbook links to online, full-length, free video lectures; you can also find them here: https://www.youtube.com/user/CenterofMath/
- If at any point there is a discrepancy between what we cover in lecture vs the book vs videos, you should default to the lecture version (and please bring the discrepancy to my attention!)

Content: Extends the techniques of calculus to functions of several variables; introduces vector fields and vector calculus in two and three dimensions. Topics include lines and planes, 3D graphing, partial derivatives, the gradient, tangent planes and local linearization, optimization, multiple integrals, line and surface integrals, the divergence theorem, and theorems of Green and Stokes with applications to science and engineering.

Grading: The following items will contribute to your final grade.

- Final exam (40%) – There is a 2-hour cumulative final exam during the final exam week.
- Quizzes (20%) – In-class quizzes will given weekly, except on weeks which have an exam.
- Midterm exams (40%) – There will be two in-class, one-hour exams (see schedule), each worth 20%.

Letter exams will follow the standard 10-point windows.

Exercises: Suggested textbook exercises are included in the schedule below; these will not be collected – **you should do them anyway!** Exam and quiz questions will be based on these exercises.

Quizzes: Your lowest two quiz grades will be dropped when computing your final score; there will be no late or make-up quizzes. Quizzes will take place during the first 30 minutes of class on Thursdays, in weeks that do not have an exam (or as otherwise noted).

Exams: There will be two in-class midterm exams. The tentative dates for these are February 12 and March 26. I will confirm these dates at least a week ahead of time. Only two finals at the same time or three in one day constitute a university recognized legitimate reason to be excused from taking the final at the scheduled time. Students with such a conflict should complete a final exam conflict form, available on the registrar's website.

Exam Setting: Graphing calculators, phones, and other similar technology will not be allowed for exams or quizzes. However, for exams you will be permitted to bring a sheet of paper (standard printer paper: 8.5" × 11"); on one side (and only one side) of this piece of paper, you may handwrite (and only handwrite) anything you'd like. You can create a fresh sheet for each exam.

Academic Integrity: Don't cheat. You can access the NU academic integrity policy for details. While many things in life operate on the "better to ask forgiveness than permission" principle, this is not one of them. When in doubt, ask me ahead of time.

DAS: Have a Disability Access Services (DAS) situation? No problem; just let me know.

Exam Conflicts: If you are going to miss an exam for a university-sponsored event, provide the appropriate documentation at least a week ahead of time. Encourage your grandparents to stay healthy, as exam-season seems to be an extremely dangerous time for that population.

Other Expectations: Treat your classmates and me with respect: silence phones when you get to class, don't cause distractions during lecture, don't eat delicious-smelling food without sharing, etc. Finally, I expect you to give an honest effort and have a good attitude. The number one cause of poor performance in any math class is an "I can't do it" mentality.

Leftovers: Extra stuff that didn't fit any of the categories above:

- Canvas will be our hub for information about the course, where your grades will be posted, etc.
- As the instructor, I reserve the right to alter this syllabus at any time. I'll announce any such changes in as timely a manner as possible.
- The last day to drop a class without a W grade is January 20. The last day to drop a class with a W grade is April 16.
- Every student is expected to complete the online TRACE survey at the end of the semester.
- If you have any issues at all, please do not hesitate to contact me. Pretty much every problem can be resolved via communication. If you do not feel comfortable talking to me directly, you can always contact the Course Coordinator, Dr. Sumi Seo. If the issue remains unresolved, you can contact the Mathematics Teaching Director, Dr. Alexander Martsinkovsky.
- This is a fast-paced course. *Do not get behind.* This class will require a significant chunk of out-of-class time; make sure you respect the amount of work needed.
- Technology is a double-edged sword in learning mathematics. You should strive to use technology to enhance your understanding without using it as a crutch.
- Patience is your biggest ally. You will get stumped from time to time. Resist the urge to immediately ask for help or to right away Google or ask ChatGPT the answer. Instead, try different things; see what you can do with the tools and techniques you have. Draw a picture. Attempt to do the stupidest, most straight-forward thing possible, and work from there. The process of exploring questions and actively struggling with them will be the most helpful aspect of the class. Don't be Flanders Sr.:

Tentative Weekly Schedule

Week 1: January 7–9 (no quiz)
§1.2 Review: $\mathbb{R}^n$ as a vector space. #1, 3, 5, 7, 9, 10, 13–16, 19–21, 23, 24, 27, 33, 36, 41–43, 45, 46
§1.3 Review: Dot product. #1–4, 9–12, 17–19, 22, 23, 27–30, 33–35, 45-48
§1.4 Review: Lines, planes, and hyperplanes. #1–4, 9–12, 13–17, 19, 21–23, 27-30
Week 2: January 12–16 (Quiz 1)
§1.5 Review: Cross product. #1–4, 9–12, 17–20, 27–29, 31, 35, 37, 41
§1.6 Functions of a single variable. #1, 4, 5, 7, 9, 10, 18, 19, 21–25, 29, 33–35
§1.7 Multivariable functions. #1, 2, 4, 27, 28
§1.8 Graphing surfaces. #1–10, 11–15, 19, 20, 23, 25
Week 3: January 20–23 (Quiz 2)
Monday, January 19, Martin Luther King Jr. Day, No classes
§2.1 Partial derivatives. #1, 2, 5, 7, 16, 18, 19, 22, 27, 29, 32, 34
§2.3 Linear approximation, tangent planes, and the differential. #1, 3, 5, 6, 11, 12, 15, 17, 22, 23
Week 4: January 26–30 (Quiz 3)
§2.4 Differentiation rules. #1–4, 8, 19, 20, 23, 25, 27, 31, 32
§2.5 Directional derivatives. #1–3, 7–9, 15–17, 21–23, 29–31, 33–35
§2.7 Level sets and gradient vectors. #1–3, 7–13, 17, 18, 21, 24
Week 5: February 2–6 (Quiz 4)
§2.8 Parameterizing surfaces. #1–3, 5, 9–11, 17–19, 21, 29, 30
§2.9 Local extrema. #1–6, 9–14, 17–20, 35
§2.10 Optimization. #1, 2, 7, 8, 9, 10, 13, 17, 19, 20
Week 6: February 9–13 (no quiz)
§2.11 Lagrange multipliers. #1, 3, 12, 13, 15, 19, 23, 27, 29
Test 1 Review & **Exam 1**
Week 7: February 17–20 (Quiz 5)
Monday, February 16, Presidents Day, No classes
§3.1 Iterated integrals. #1, 3, 4, 5, 9, 16, 17–24, 27, 28
§3.2 Integration in $\mathbb{R}^2$. #1–3, 6–8, 17, 18, 23, 24, 27–29, 31–33
Week 8: February 23–27 (Quiz 6)
§3.3 Polar coordinates. #1–7, 17
§3.4 Integration in $\mathbb{R}^3$ and $\mathbb{R}^n$. #1, 3, 6, 7, 9, 11, 13, 14, 16–18, 20
§3.5 Volume. #1–3, 9–11, 17, 18
March 2–6, Spring break, No classes
Week 9: March 9–13 (Quiz 7)
§3.6 Cylindrical and Spherical coordinates. #1–3, 7–9, 13–15, 19–21, 25–27, 31, 32, 35, 36
§3.8 Density and mass. #1, 2, 7–10
Week 10: March 16–20 (Quiz 8)
§3.11 Surfaces and area. #1–3, 9, 11–13, 15–17, 19–21
§4.1 Vector fields. #1, 3, 7, 8–14, 17, 18, 21, 22, 26–28
Week 11: March 23–27 (no quiz)
§4.2 Line integrals. #1–3, 7, 8, 15, 16, 18–20, 23, 25, 27
Test 2 Review & **Exam 2**
Week 12: March 30–April 3 (Quiz 9)
§4.3 Conservative vector fields. #1-3, 7-9, 15–17, 23, 24, 27, 33, 35, 41, 43
§4.4 Green's Theorem. #1, 3, 5, 7–9, 13, 15
Week 13: April 6–10 (Quiz 10)
§4.5 Flux through a surface. #1, 2, 7, 9, 10, 11, 15, 19, 20
§4.6 The Divergence Theorem. #1–4, 6–11
Week 14: April 13–17
§4.7 Stokes' Theorem. #1, 2, 5, 6, 9, 10, 17
Review for the final exam
April 21–26, Final Exams