

Math 2321 – Calculus 3 for Science and Engineering: Syllabus Northeastern University, Spring 2015

Instructor: Chris Kottke

Office: #455 Lake Hall

Email: c.kottke@neu.edu

Course website: <http://www.northeastern.edu/ckottke/2321/>. Blackboard will not be used, except perhaps to record grades.

Office hours: M 10:30-12, W 12-1:30, or by appointment.

Text: *Worldwide Multivariable Calculus*, by David B. Massey. PDF and printed versions available at: <http://www.centerofmath.org/textbooks/calc3/>

The PDF is priced at \$9.95, while the black and white (grayscale) soft-back printed version is \$29.95. The PDF textbook contains a link, at the beginning of each section, to one or more free video lectures, by Prof. Massey, on the contents of that section. The PDF has hyperlinked Tables of Contents, Indices, and cross-references; you may need to activate the Forward and Back buttons in your PDF viewer to take full advantage of the hyperlinks. To use the textbook on an iPad, we recommend the free Adobe Reader app.

It is absolutely *NOT* required that you purchase a printed textbook.

Exercises: Exercises will be assigned after every lecture, but will not be collected. Rather, they will serve as preparation for the bi-weekly quizzes below. If you have questions on the exercises, you are encouraged to come to office hours, make a special appointments to see me, go to our TA's office hours, or go for tutoring in the Mathematics Department or in the College of Engineering.

Quizzes: There will be six in-class quizzes, of which the lowest will be dropped. The dates will be announced (in class and on the website) as the class gets underway. Grades on the quizzes will be curved.

Final Exam: There will be a cumulative final exam in this course, the date of which is to be determined. *Check for exam schedule conflicts as soon as possible.*

Snow Days: If classes are canceled due to snow, or for other official reasons, any scheduled quiz will occur on the next class meeting. The content of the quizzes will be similar to the assigned exercises.

Grading: The course grade will be determined as follows: Final exam: 40%, Quizzes: 60%.

Course TA: Monika Pichler, 537 NI. Office hours: Tue 11:30–1:00, 5:00–6:00 and Wed 11:30–1:00.

Recitation: Wednesday, 2:50-4:30pm, 312 Ell Hall

Additional Resources:

The Mathematics Department Tutoring Center is in Room 540B, Nightingale Hall. This peer tutoring is free. Peer Tutoring appointments can be booked via MyNEU under TUTORING. Although you can walk in, it is really best to sign up in advance. Tutoring requests are scheduled by students in real-time and confirmed by email. Next-day appointments must be booked by 9:00pm the previous day. It is expected that tutoring services in the Mathematics Department Tutoring Center will begin the week of September 15. A partial schedule will likely be available before then, and any updates on the availability of peer tutoring before Sep 15 will be announced in class. See <http://www.northeastern.edu/csastutoring/setting-up-appointments/> for more information about peer tutoring.

The College of Engineering also provides tutoring for Calculus. See <http://www.coe.neu.edu/undergraduate-support/tutoring/> for more details.

The PDF textbook contains links at the beginning of each section to online full-length, free, video lectures on the contents of that section. These videos can also be accessed directly by going to: <http://www.centerofmath.org/videos/index.html#subject5>. If there is a discrepancy between how the videos present material and how your instructor presents material, you should follow your instructor's presentation, but you should discuss the matter with your instructor.

An independent video-tutoring company, Kahn Academy, has produced a large collection of free, short video tutorials and examples on many topics, including Calculus; the URL is <http://www.khanacademy.org/>.

If there is a discrepancy between how the videos present material and how your instructor presents material, you should follow your instructor's presentation, but you should discuss the matter with your instructor.

Issues with the course/instructor: If you have issues with this course and/or instructor which you are not comfortable discussing with your instructor, you should contact the Teaching Director, Prof. Massey, at d.massey@neu.edu.

Topics and Exercises:

Review §1.2: \mathbb{R}^n as a vector space. #1, 3, 5, 7, 9, 10, 13–16, 19–21, 23–24, 27, 29, 33, 36, 41–43, 45, 46

Review §1.3: Dot product, angles, and orthogonal projection. # 1–4, 9–12, 17–19, 22, 23, 27–30, 33–35, 45–48.

Review §1.4: Lines, planes, and hyperplanes #1–4, 9–12, 13–17, 19, 21–23, 27–30,

Review §1.5: Cross product. #1–4, 9–12, 17–20, 27–29, 31, 35, 37, 41.

Review §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, 7–10, 15, 17–19, 21, 27, 28.

§1.8: Graphing surfaces. #1–10, 11–15, 19, 20, 23, 25.

§2.1: Partial derivatives. #1, 2, 5, 7, 13, 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.

§2.4: Differentiation rules. #1–4, 8, 19, 20, 23, 25, 27, 31, 32.

§2.5: Directional derivatives. #1, 3, 5–7, 11–13, 19–21, 25–27, 33–35, 37.

§2.7: Level sets and gradient vectors. #1–3, 7–13, 17, 18, 21, 24.

§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.

§2.11: Lagrange multipliers. #1, 3, 12, 13, 15, 19, 23, 27, 29.

§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.

§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.

§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.

§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.

§4.2: Line integrals. #1–3, 7, 8, 15, 16, 18–20, 23, 25, 27.

§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.

§4.5: Flux through a surface. #1, 2, 7, 9, 10, 11, 15, 19, 20.

§4.6: The Divergence Theorem. #1–4, 6–11.

§4.7: Stokes' Theorem. #1, 2, 5, 6, 9, 10, 17.