

CALCULUS III, MATH-UA 129 OR MA-UY 2514A

VECTOR CALCULUS (MULTIVARIABLE CALCULUS)

Instructor: Prof. Leif Ristroph (lr1090@nyu.edu)

Lectures: Mondays and Wednesdays 11:00am-12:50pm (NY time) in WWH 517 and via Zoom
with recordings available on the NYUClasses site

Office: Courant Institute, Warren Weaver Hall (WWH) Room 1127 (11th floor)

Office hours: Thursdays 8-9pm and Fridays 4:30-5:30pm via Zoom

Course materials

- Required textbook: J. E. Marsden & A. Tromba's *Vector Calculus*, 6th edition. It is recommended that you scan over the sections prior to lectures and use the text also for extra practice problems. We will cover almost all sections but not exactly in order (see schedule and roadmap).
- Supplemental textbooks: The following are NOT required but may be useful references and sources of more practice problems: J. Stewart's *Essential Calculus (Early Transcendentals)*, 2nd edition; H. M. Schey's *div, grad, curl and all that*, 4th edition.
- NYUClasses: This syllabus will be posted under Resources, and it may be updated occasionally throughout the semester. You will also be able to access any other course documents such as lecture notes (also under Resources), Zoom links and recordings, GradeScope, etc.
- Zoom: Access links to live lectures and office hours through our NYUClasses page, and you can also find recordings of previous lectures.
- GradeScope: Turn in all assignments by accessing GradeScope through our NYUClasses page. This is how written homework assignments, quizzes and exams will be transferred between us.
- Computer, phone/scanner and internet access: Please make sure you have a reliable computer with reliable internet access to attend the Zoom lectures. And you will need a phone or scanner to quickly scan assignments for upload to GradeScope.

Assignments and grading

- I will NOT be using the gradebook on NYUClasses but will be happy to review grades at any office hours. I will also issue a mid-semester overall grade estimate in October after E#1.
- Homework (HW) assignments are due at the *beginning of class* according to the schedule below. The problems are given below and should be submitted via GradeScope. You may write by hand, by tablet or type up the solutions, but please do present clear, legible and complete work. Grading is on a 3-point scale: 0 for no genuine attempt, 1 for major conceptual errors, 2 for more minor computation errors, 3 for near-perfect or perfect work.
- No late assignments/quizzes/exams are allowed, except under extreme circumstances (e.g. medical emergency with doctor's note) and notification at least 24 hours in advance.
- There will be a few short Quizzes (approximate dates given below) typically lasting ~45 minutes. They will follow certain HW's and cover the same topics.
- There will be two in-class Exams, each lasting ~60 minutes and covering material more comprehensively than the quizzes. Also, the Final Exam will be 110 minutes, cumulative, and given at a date/time to be announced on NYU Albert.
- The roadmap below shows how topics, book sections, HW's, Q's and E's are all related.
- Grade breakdown: Homework (15%), Quizzes (25%), Exam #1 (15%), Exam #2 (15%), Final Exam (30%).
- Individual assignments are not curved, but the overall course grade will follow standard departmental distributions. Very roughly, scores in the A range (A- to A) require near mastery at the level of ~90%, and those in the B range (B- to B+) will lie in 80-89%. More accurate estimates of grades can be given in office hours during the semester.

Course schedule. This is tentative and updates will be posted on NYUClasses. The numbers indicate textbook sections to be covered on lecture days, and parentheses are placed around some sections indicate these will be covered partially or only if time permits. Also indicated are the due dates of homework (HW) and tentative dates for quizzes (Q) and exams (E#1, E#2 and Final Exam).

		Monday	Wednesday
1	Sep 2	--	Introduction, 1.1, 1.2
2	Sep 7, 9	-- Labor Day! --	1.2, 1.3
3	Sep 14, 16	1.4, 1.5	HW#1, 2.4, 4.1, 4.2
4	Sep 21, 23	4.2, 2.1, 2.2	Q#1, 2.2, 2.3
5	Sep 28, 30	HW#2, 2.3, 2.5	2.5, 2.6
6	Oct 5, 7	Q#2, 3.1, 3.2	3.2, (3.5), 3.3
7	Oct 12, 14	HW#3, 3.3, 3.4	3.4, 5.1, 5.2
8	Oct 19, 21	E#1, 5.2, 5.3	5.3, 5.4
9	Oct 26, 28	HW#4, 5.5, (6.3)	Q#3, 5.5, 6.1, 6.2
10	Nov 2, 4	HW#5, 6.2, (6.4), 4.3, 4.4	Q#4, 4.4, 7.1
11	Nov 9, 11	7.1, 7.2	7.2, 8.3
12	Nov 16, 18	HW#6, 8.3, 7.3	7.4, 7.5
13	Nov 23, 25	E#2, 7.5	7.6, (7.7)
14	Nov 30, Dec 2	HW#7, 7.6, 8.1	8.1, 8.2
15	Dec 7, 9	Q#5, 8.2	HW#8, 8.4, (8.5), Review
		FINAL: Day/time/place to be announced on NYU Albert	

Roadmap to the course. This map helps to organize the course by major topics to be covered, the associated sections in the textbook, and homework (HW) assignments, quizzes (Q) and exams (E and FE).

TOPICS	BOOK SECTIONS	HOMEWORK, QUIZZES & EXAMS	
vectors & 3D geometry	1.1, 1.2, 1.3, 1.4, 1.5	HW#1 Q#1	} E#1
vector functions (space curves) scalar fields	2.4, 4.1, 4.2, 2.1, 2.2	HW#2 Q#2	
scalar field derivatives (partials, directionals & gradient)	2.3, 2.5, 2.6, 3.1, 3.2, (3.5)	HW#3	
scalar field optimization scalar field integrals	3.3, 3.4, 5.1, 5.2, 5.3	HW#4 Q#3	} E#2
(double & triple integrals)	5.4, 5.5, (6.3), 6.1, 6.2, (6.4)	HW#5 Q#4	
vector fields... ... & path integrals ... their derivatives (div and curl)	4.3, 4.4, 7.1, 7.2, 8.3	HW#6	
surface integrals (of scalar & vector fields)	7.3, 7.4, 7.5, 7.6, (7.7)	HW#7 Q#5	
fundamental theorems (Green's, Stokes' & Gauss')	8.1, 8.2, 8.4, (8.5)	HW#8	

HW problem sets. Solutions can be handwritten (clearly and neatly) or typed up and turned in via GradeScope according to the schedule. For each problem set, please submit the solutions numbered clearly and in the same order as below. Show all of your work, and it helps to include notes about your reasoning. Each problem X.Y.Z indicates chapter, section and exercise, and the few cases of X.Z indicate exercise Z from the review section at the end of chapter X. These sets are considered *minimal* practice for quizzes and exams, and you should work extra problems as you need.

<p>HW#1</p> <p>1. 1.1.11 2. 1.1.14 3. 1.1.20 4. 1.1.28 5. 1.1.31 6. 1.2.14 7. 1.2.24 8. 1.2.38 9. 1.3.28 10. 1.3.32 11. 1.4.3 12. 1.4.6 13. 1.4.10 14. 1.17 15. 1.25</p>	<p>HW#2</p> <p>1. 2.4.4 2. 2.4.18 3. 2.4.22 4. 4.1.14 5. 4.1.25 6. 4.2.4 7. 4.2.14 8. 2.1.6 9. 2.1.10 10. 2.1.24 11. 2.1.26 12. 2.2.4 13. 2.2.6 14. 2.2.8 15. 2.2.14</p>	<p>HW#3</p> <p>1. 2.3.4 2. 2.3.16 3. 2.3.18 4. 2.5.2 5. 2.5.6 6. 2.5.22 7. 2.6.2 8. 2.6.6 9. 2.6.22 10. 3.1.4 11. 3.1.9 12. 3.1.30 13. 3.1.3 14. 3.2.2 15. 3.2.4</p>	<p>HW#4</p> <p>1. 3.3.19 2. 3.3.34 3. 3.3.44 4. 3.4.4 5. 3.4.6 6. 3.4.12 7. 3.4.28 8. 3.4.31 9. 3.4.39 10. 5.1.4 11. 5.2.6 12. 5.2.12 13. 5.3.4 14. 5.3.16 15. 5.3.18</p>
<p>HW#5</p> <p>1. 5.4.4 2. 5.4.10 3. 5.4.16 4. 5.5.2 5. 5.5.4 6. 5.5.8 7. 5.5.14 8. 5.5.24 9. 5.5.30 10. 6.2.2 11. 6.2.6 12. 6.2.16 13. 6.2.26 14. 6.2.30 15. 6.3.10</p>	<p>HW#6</p> <p>1. 4.3.10 2. 4.3.14 3. 4.3.26 4. 4.4.8 5. 4.4.34 6. 4.4.38 7. 4.4.40 8. 7.1.8 9. 7.1.12 10. 7.1.18 11. 7.2.3 12. 7.2.8 13. 8.3.4 14. 8.3.10 15. 8.3.19</p>	<p>HW#7</p> <p>1. 7.3.2 2. 7.3.8 3. 7.3.18 4. 7.4.6 5. 7.4.24 6. 7.5.4 7. 7.5.8 8. 7.5.26 9. 7.6.2 10. 7.6.6 11. 7.6.19 12. 7.6.22</p>	<p>HW#8</p> <p>1. 8.1.4 2. 8.1.8 3. 8.1.12 4. 8.2.4 5. 8.2.15 6. 8.2.16 7. 8.2.20 8. 8.4.4 9. 8.4.10 10. 8.4.16 11. 8.24</p>