Math 53 - Section 1 - Multivariable Calculus - Fall 2013

Denis Auroux - MWF 2-3pm, Room 155 Dwinelle

[Announcements] [Textbook] [Grading policy] [Homework] [Exams] [Syllabus] [Resources] [Sections]

Instructor: Denis Auroux (auroux@math.berkeley.edu)

Office: 817 Evans.
Office hours (finals week): Wednesday 2-3:30pm (still subject to slight changes).

Lectures: Mondays, Wednesdays and Fridays, 2-3pm, 155 Dwinelle
Discussion sections: Mondays, Wednesday and Fridays, at various times.

Section enrollment/changes are performed through TeleBears. Note: Keep in mind that, even if the lecture isn't full, you will get placed on the waitlist if you try to enroll in a discussion section that is full, and won't get off the waitlist until space opens up in that section.

Announcements

- (12/21, 10am) Final exam scores are on bSpace. The median on the final was 146 out of 200. Final grades will be visible in BearFacts by Sunday night.
- (12/12) Office hours during finals week: I will have some office hours on Wednesday afternoon, most likely from 2 to 3:30pm, in 817 Evans. Any changes in these times will be posted here, so please check back closer to Wednesday.
- (12/11) **Final exam rooms:**
  - morning sections **101-107** (Kun Chen, Qiaochu Yuan, Noah Schweber, Catherine Cannizzo) in **220 Hearst Gym**.
  - afternoon sections **108-114** (Kun Chen, Justin Chen, Benjamin Harrop-Griffiths, Kieren James-Lubin) in **230 Hearst Gym**.
  - late afternoon sections **115-117** (Maryam Farahmand, Aditya Adiredja) in **251 Hearst Gym**.
- (12/9, 10:30am) Due to a scheduling request error, we do not have 155 Dwinelle today from 2-3pm; the review session will be in **100 Lewis** instead (still 2-3pm). There will be an additional review session (covering parts of the practice midterms and midterms) on Wednesday 2-3pm in 100 Lewis as well.
- (12/7) It has been brought to my attention that 155 Dwinelle was double-booked on Monday afternoon for us and for a CS61B review session. I hope to resolve this on Monday morning; if there is a change in time/place of the second Math 53 review session I will send an e-mail to the whole class (+ post it here).
- (12/6) Prof. Auroux's office hours for RRR week (in 817 Evans): Tuesday 10-11:30am, Wednesday 2-4pm, Thursday 10-11:30am. Please note that I will be less available during finals week (but will try to schedule at least one more office hour before the final).
- (11/25, 10:50pm) Midterm 2 scores are uploaded to bSpace. Information about the class median and quartiles can be found below; rough grade cut-offs and solutions will be added by Wednesday. You will get your exam back in section on Wednesday. Also: note that the last quiz will take place on Wednesday 12/4 instead of Monday 12/2 (except section 117).
- (11/22) If you really can't imagine waiting until Wednesday to know whether you got the right answers to HW 12 problems, you can check here. The solutions will have to wait until after the homework has been turned in, however.
- (11/14) Due to a call for a strike by the union representing GSIs, some discussion sections may be cancelled on Wednesday 11/20. The lecture will take place normally, and HW 11 is still due. Please check with your GSI whether your section meets next Wednesday. If it does not, ask about arrangements for submitting HW 11 and any make-up office hours or review sessions. I have instructed GSIs who participate in the strike to do their best to ensure that you can still work with them and get practice on the various topics that we will cover in class before the midterm.
- (11/6) **Practice midterms** for midterm 2 are now posted. However I strongly recommend waiting until we have covered all the material before attempting them (right now, half of the problems are about material we have not seen yet).
- (10/28) I have to make an unscheduled trip out of the country at the end of this week, and will be away on Friday Nov 1. This Friday's lecture will be taught by Prof. Craig Evans. Friday's office hours are cancelled. Sorry!
- (10/16) Reading assignments for 10/23-10/30 revised to reflect a change in section numbering in 7th edition of Stewart. The sections we'll be covering are 15.7 to 15.10 of 7th edition (=15.6 to 15.9 of 6th ed.)
- (10/14, 10pm) Midterm 1 solutions are posted below, as well as statistics about the score distribution. Individual scores have been uploaded to bSpace.
- (10/11) Answers to the review problems on HW 6 are available, in case you want to check your work. As usual, full solutions will only become available after the due date!
- (10/3) Office hours on Friday 10/4 will end earlier than usual and take place in the lecture hall: 3-4pm in 155 Dwinelle.
- (10/1) **Practice midterms** for midterm 1 (longer than the actual midterm) have been posted below. But I recommend waiting until this weekend (and until you have reviewed the material) to look at them. After Friday 10/4 the only missing topic will be Lagrange multipliers, so you'll be able to do all but Problem 9 on each practice exam.
- (10/1, 8:30pm) According to the latest news update, it seems that the **power outage** affecting Dwinelle has been resolved with the help of backup generators, so Wednesday's lecture is expected to take place normally.
- (9/25) To avoid further cancellations, Prof. Auroux's Tuesday office hours will be **10-11:30am** from now on (still in 817 Evans). Sorry for the inconvenience.
- (9/19) I won't be able to hold office hours on Tuesday 9/24. Sorry!
- (8/29) To clarify a frequently asked question: yes, the discussion sections do meet tomorrow Friday 8/30 (even before the first

lecture).
- (8/28) Make sure to read the course policy and the detailed syllabus.

Textbook

The textbook for this course is: **Stewart, *Multivariable Calculus: Early Transcendentals for UC Berkeley***, 7th edition (ISBN: 978-1-285-13239-6, Cengage).

This is a custom edition containing chapters 10 and 12-16 of Stewart's "Calculus: Early Transcendentals", 7th edition; the regular edition is also fine. The 6th edition is also acceptable, but you will need to watch for differences in the numbering of assigned homework problems.

Grading and course policy

Weekly homework and quizzes 25%; two midterms 25% each; final exam 25%; the lowest midterm can be dropped and replaced by the final exam grade. There will be **no make-up exams**. This grading policy allows you to miss one midterm, but check your schedule to make sure you have no conflict for the final exam.

Make sure to read the detailed **course policy** for important information.

Homework

Homework assignments are due each Wednesday in section; they will be posted here.

- Homework 1 (due Wednesday 9/11) and solutions.
- Homework 2 (due Wednesday 9/18) and solutions.
- Homework 3 (due Wednesday 9/25) and solutions.
- Homework 4 (due Wednesday 10/2) and solutions.
- Homework 5 (due Wednesday 10/9) and solutions.
- Homework 6 (due Wednesday 10/16) and solutions.
- Homework 7 (due Wednesday 10/23) and solutions.
- Homework 8 (due Wednesday 10/30) and solutions.
- Homework 9 (due Wednesday 11/6) and solutions.
- Homework 10 (due Wednesday 11/13) and solutions.
- Homework 11 (due Wednesday 11/20) and solutions.
- Homework 12 (due Wednesday 11/27). and solutions.
- Homework 13 (due Friday 12/6) and solutions.

Exams

There will be two midterms, on **Monday October 14 and Monday November 25 (2-3pm)** in the usual lecture room. The final exam will be on **Thursday 12/19 (3-6pm) in 220, 230 and 251 Hearst Gym.** (Room 220: sections 101-107; Room 230: sections 108-114; Room 251: sections 115-117).

Practice exams and solutions to midterms will be posted here. Please note: the practice midterms are longer (80-90 minutes) than the actual midterms (50 minutes, during regular class time).

- Practice midterm 1A and solutions
- Practice midterm 1B and solutions
- MIDTERM 1 SOLUTIONS

- Practice midterm 2A and solutions
- Practice midterm 2B and solutions
- MIDTERM 2 SOLUTIONS

- Practice final and solutions

Midterm 1 score distribution: the quartiles are 60, 75, 84. (i.e.: 25% of the class got above 84, 25% got between 75 and 84, 25% got between 60 and 75, 25% got below 60). Individual scores are on bSpace.

A very rough estimate of what this might mean in terms of letter grades: cut-off between A- and B+ = somewhere around 83-85; cut-off between B- and C+ somewhere around 67-69; cut-off between C- and D somewhere around 53-55.

Midterm 2 score distribution: the quartiles are 49, 65, 79. (i.e.: 25% of the class got above 79, 25% got between 65 and 79, 25% got between 49 and 65, 25% got below 49).

A very rough estimate of what this might mean in terms of letter grades: cut-off between A- and B+ = somewhere around 81-83; cut-off between B- and C+ somewhere around 61-63; cut-off between C- and D somewhere around 46-48.

Final exam score distribution: the quartiles are 122, 146, 168 (out of 200). (i.e.: 25% of the class got above 168, 25% got between 146

and 168, 25% got between 122 and 146), 25% got below 122. Cut-offs: A-/B+ = somewhere around 170; B-/C+ = somewhere around 140; C-/D = somewhere around 110.

Syllabus

Date	Topics	Book
Fri 8/30	Parametric equations	§ 10.1, 10.2
Mon 9/2	NO CLASS (Labor Day)	
Wed 9/4	Polar coordinates	§ 10.3
Fri 9/6	Polar coordinates continued	§ 10.4
Mon 9/9	Vectors, dot product	§ 12.1, 12.2, 12.3
Wed 9/11	Dot product continued; determinant	§ 12.3
Fri 9/13	Cross product	§ 12.4
Mon 9/16	Equations of lines and planes	§ 12.5
Wed 9/18	Parametric equations and vector functions	§ 13.1
Fri 9/20	Velocity, acceleration	§ 13.2, 13.4
Mon 9/23	Functions of several variables	§ 14.1
Wed 9/25	Partial derivatives	§ 14.2, 14.3
Fri 9/27	Tangent plane, linear approximation	§ 14.4
Mon 9/30	Chain rule	§ 14.5
Wed 10/2	Gradient, directional derivatives	§ 14.6
Fri 10/4	Max-min problems	§ 14.7
Mon 10/7	Max-min problems continued	§ 14.7
Wed 10/9	Lagrange multipliers	§ 14.8
Fri 10/11	Review	
Mon 10/14	*MIDTERM 1*	
Wed 10/16	Double integrals	§ 15.1, 15.2, 15.3
Fri 10/18	Double integrals in polar coordinates	§ 15.4
Mon 10/21	Applications of double integrals	§ 15.5
Wed 10/23	Change of variables in double integrals	§ 15.10
Fri 10/25	Triple integrals	§ 15.7
Mon 10/28	Triple integrals in cylindrical coordinates; applications	§ 15.8
Wed 10/30	Triple integrals in spherical coordinates	§ 15.9
Fri 11/1	Vector fields	§ 16.1
Mon 11/4	Line integrals	§ 16.2
Wed 11/6	Gradient fields, fundamental theorem for line integrals	§ 16.3
Fri 11/8	Green's theorem	§ 16.4
Mon 11/11	NO CLASS (Veterans' Day)	
Wed 11/13	Curl and divergence, Green's theorem revisited	§ 16.5
Fri 11/15	Surface area	§ 16.6
Mon 11/18	Surface integrals and flux	§ 16.7
Wed 11/20	The divergence theorem	§ 16.9
Fri 11/22	Review	
Mon 11/25	*MIDTERM 2*	
Wed 11/27	More about the divergence theorem	§ 16.9
Fri 11/29	NO CLASS (Thanksgiving)	
Mon 12/2	Stokes' theorem	§ 16.8
Wed 12/4	Stokes' theorem continued; applications to physics	§ 16.8
Fri 12/6	Review	
Mon 12/9	Optional review (RRR week)	
Thu 12/19	*FINAL EXAM (3-6pm)*	

Additional resources

MIT's OpenCourseWare project has a nice set of video lectures for MIT's multivariable calculus class, taught by a familiar instructor. The overall course topics are roughly the same, but they are covered in a different order and not quite in the same manner, so don't use this as a replacement for attending lectures!

Discussion sections

Section	Time	Room	Instructor	e-mail	Office hours
101	MWF 8-9am	87 Evans	Kun Chen	ck90624ck@berkeley.edu	F 12-2 / 1070 Evans
102	MWF 8-9am	2 Evans	Qiaochu Yuan	qyuan@berkeley.edu	M & Th 3-4 / 832 Evans
103	MWF 9-10am	30 Wheeler	Noah Schweber	schweber@berkeley.edu	?
104	MWF 9-10am	200 Wheeler	Qiaochu Yuan	qyuan@berkeley.edu	M & Th 3-4 / 832 Evans
105	MWF 12-1pm	110 Barker	Catherine Cannizzo	ckacannizzo@berkeley.edu	M 3:15-4 & Tu 1:30-3:45 / 832 Evans
106	MWF 10-11am	103 Moffitt	Noah Schweber	schweber@berkeley.edu	?
107	MWF 11-12pm	237 Cory	Catherine Cannizzo	ckacannizzo@berkeley.edu	M 3:15-4 & Tu 1:30-3:45 / 832 Evans
108	MWF 12-1pm	210 Wheeler	Benjamin Harrop-Griffiths	benhg@math.berkeley.edu	M 5-6 & W 10:30-11:30 / 737 Evans
109	MWF 12-1pm	9 Evans	Justin Chen	jchen419@berkeley.edu	TT 11:30-12:30 / 1064 Evans
110	MWF 12-1pm	7 Evans	Kieren James-Lubin	ksjames@berkeley.edu	?
111	MWF 1-2pm	220 Wheeler	Justin Chen	jchen419@berkeley.edu	TT 11:30-12:30 / 1064 Evans
112	MWF 1-2pm	200 Wheeler	Benjamin Harrop-Griffiths	benhg@math.berkeley.edu	M 5-6 & W 10:30-11:30 / 737 Evans
113	MWF 3-4pm	3111 Etcheverry	Kun Chen	ck90624ck@berkeley.edu	F 12-2 / 1070 Evans
114	MWF 3-4pm	B56 Hildebrand	Kieren James-Lubin	ksjames@berkeley.edu	?
115	MWF 4-5pm	B51 Hildebrand	Maryam Farahmand	mfarahmand@math.berkeley.edu	MW 3-4pm / 1037 Evans
116	MWF 5-6pm	71 Evans	Maryam Farahmand	mfarahmand@math.berkeley.edu	MW 3-4pm / 1037 Evans
117	TT 6-8pm	230C Stephens	Aditya Adiredja	aditya@berkeley.edu	MW after lecture; Tu 5-6 & Th 4-6 in 230C Stephens