Instructor
Brent Nelson
Evans 851
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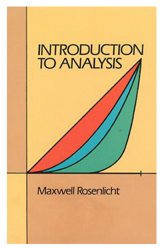
Lecture
Tuesdays and Thursdays
11:00 am - 12:30 pm
Cory 289

Office Hours: Tuesdays 3:30 pm - 5:30 pm, Wednesdays 11:00 am - 12:30 pm, and by appointment.

Course Webpage: http://www.math.berkeley.edu/~brent/H104.html

Textbook: Maxwell Rosenlicht, *Introduction to Analysis*, Dover Publications



Course Description: The official course description can be found here.

We will begin with an examination of the real number system $\mathbb{R}$: codifying several properties you are already familiar with and discussing the least upper bound property. This latter property, which is crucial to the study of analysis, essentially tells us that $\mathbb{R}$ is solid enough for us to take limits, derivatives, etc. Also, we will take the real numbers $\mathbb{R}$ as given rather than constructing it from scratch (e.g. via Dedekind cuts). This shortcut will allow us to spend more time considering more general objects known as metric spaces.

Metric spaces are sets with a notion of "distance" on them. The real numbers are an example of such spaces, where we measure the distance between two points $x, y \in \mathbb{R}$ by $|x - y|$. The Euclidean plane $\mathbb{R}^2$ gives another example, where the distance between two points $(x_1, y_1), (x_2, y_2) \in \mathbb{R}^2$ is given (unsurprisingly) by the distance formula:

$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}.$$

But metric spaces can be considerably more general. This approach will benefit us later on when we wish to consider multivariable functions, but also it will turn out that *real-valued continuous functions* (another of our core topics) have a suitable notion of distance and can therefore also be studied as metric spaces. Furthermore, metric spaces are of independent mathematical interest and provide nice examples and intuition for the theory of general topology.

To study differentiation, we will return to the more concrete context of real-valued functions on the real numbers $\mathbb{R}$. We will give a formal definition of the derivative and prove the theorems you used frequently in calculus: the product rule, the quotient rule, the chain rule, the mean value theorem, and Taylor's theorem. We will also analyze the Riemann integral and discuss what it means for a function to be *integrable*. Our examination of derivatives and integrals will culminate with the Fundamental Theorem of Calculus.

The course will conclude with a study of infinite series and power series, which are again concepts you have seen in calculus but which will be treated more formally here. Time permitting, we will also discuss multi-variable functions, partial derivatives, differentiating under the integral sign, and multiple integrals.

In-Class Tone: My aim is to foster an open and inclusive atmosphere in class. Therefore questions, participation, collaboration, and curiosity are strongly encouraged. Math can be hard, especially when we aren't honest with ourselves about whether or not we understand something. Confusion is not a sign of weakness, nor is asking for help. If you need help beyond class time and office hours, please do not hesitate to contact me so that we can work out additional times to meet.

Homework: There will be a total of 12 homework assignments. These will be posted on the course webpage, and will be collected at the beginning of lecture on Thursdays. No late homework will be accepted. The lowest two homework scores will be automatically dropped. Collaboration is allowed (encouraged even), but your written proofs must clearly be your own and demonstrate that you understand the argument

Midterms: The course will have two midterm examinations:

Midterm 1	Thursday, September 29th
Midterm 2	Thursday, November 3rd

No make-up exams will be offered (see grading policy below). Please check early in the semester to make sure you have no time conflicts with these exams.

Final: The final exam will be on Wednesday, December 14th from 8:00 - 11:00 am. You must take the final exam to pass the class. Please bring your Cal 1 Card with you to the final exam.

Grading: There will be two grading schemes offered and I will automatically select the one which gives you the best grade. They are as follows:

	Homeworks	**Midterms**	**Final Exam**
Scheme 1:	20%	40% (20% each)	40%
Scheme 2:	20%	20% (best one)	60%

If you believe there is an error with the grading of any course material you must notify the instructor within 14 calendar days of when it was completed, otherwise it will not be given further consideration. The general course policies for the University of California, Berkeley can be found here.

Course Calender: The following is a preliminary schedule for the course (subject to change).

Week 1	8/22 - 8/26	No class on 8/25 (instructor out of town)
Week 2	8/29 - 9/02	Homework 1 due on 9/01
Week 3	9/05 - 9/09	Homework 2 due on 9/08
Week 4	9/12 - 9/16	Homework 3 due on 9/15
Week 5	9/19 - 9/23	Homework 4 due on 9/22
Week 6	9/26 - 9/30	**Midterm 1** on 9/29
Week 7	10/03 - 10/07	Homework 5 due on 10/06
Week 8	10/10 - 10/14	Homework 6 due on 10/13
Week 9	10/17 - 10 /21	Homework 7 due on 10/20
Week 10	10/24 - 10/28	Homework 8 due on 10/27
Week 11	10/31 - 11/04	**Midterm 2** on 11/03
Week 12	11/07 - 11/11	Homework 9 due on 11/10
Week 13	11/14 - 11/18	Homework 10 due on 11/17
Week 14	11/21 - 11/25	Homework 11 due on 11/22 No class on 11/24 (Thanksgiving Break)
Week 15	11/28 - 12/02	Homework 12 due on 12/02
Week 16	12/05 - 12/09	No class (Reading/Review/Recitation Week)
Finals Week	11/12 - 11/16	**Final Exam** on 12/14 (8-11 am)