

Math 10B

Methods of Mathematics: Calculus, Statistics, and Combinatorics

UC Berkeley, Spring, 2013

Final version

Professor L. C. Evans
1033 Evans Hall, (510) 643-7417
evans@math.berkeley.edu

Office Hours: MWF 11-12 + M 4-5 (after class) + appointments

General information: There is no text for this class, but I will provide extensive online notes and will also post the various homework assignments. The single best way to get a good grade in the class is to come to every lecture and to take notes. I will mostly present in class different examples from those provided online.

Class meetings: The main lectures are Mondays, Wednesdays and Fridays, 3:10-4:00 pm, in Room 10, Evans Hall. There are in addition 6 discussion sections:

Section	Instructor	Time (MWF)	Location
102	Ferguson, J	10-11 am	39 Evans
103	Ferguson, J	11-12 am	47 Evans
104	Ke, L	12-1 pm	41 Evans
105	Ren, Q	1-2 pm	41 Evans
106	Ren, Q	2-3 pm	45 Evans
108	Ke, L	4-5 pm	55 Evans

OVERVIEW OF COURSE

Topic	Number of lectures
Introduction	1
Combinatorics	8
Probability, statistics	12
Dynamics	9
Matrix Algebra	8
Midterms	2
Reviews	2
Total classes	42

	Date	Main lecture topic	Discussion sections
1	Jan 23	Introduction	
2	Jan 25	The basics of counting	
3	Jan 28	Inclusion-exclusion principle	
4	Jan 30	Pigeonhole principle	Homework 1 due, Quiz
5	Feb 1	Permutations, combinations	Homework 2 due
6	Feb 4	Binomial coefficients	Homework 3
7	Feb 6	Balls into boxes: the 12-fold way	Quiz
8	Feb 8	More on the 12-fold way	Homework 4
9	Feb 11	Algorithms: stable assignments	Homework 5
10	Feb 13	Probability	Quiz
11	Feb 15	Conditional probability	Homework 6
	Feb 18	HOLIDAY	
12	Feb 20	Bayes' Theorem	Homework 7, Quiz
13	Feb 22	Independence	Homework 8
14	Feb 25	Random variables	Homework 9
15	Feb 27	Discrete distributions	Quiz
16	March 1	More on discrete distributions	Homework 10
17	March 4	Expected value, variance	Homework 11
18	March 6	Statistical tests	Quiz
19	March 8	Parameter estimation	Homework 12
20	March 11	Hypothesis testing, χ^2 tests	
21	March 13	MIDTERM #1	covers Lectures 1-17
22	March 15	More on χ^2 tests	Homework 13
23	March 18	Recursion equations	Homework 14
24	March 20	Differential equations	Quiz
25	March 22	Linear first-order ODE	Homework 15
	March 25-28	SPRING BREAK	
26	April 1	Partial fractions	
27	April 3	Nonlinear separable ODE	Homework 16, Quiz
28	April 5	Second-order linear ODE	Homework 17
29	April 8	More on second-order linear ODE	Homework 18
30	April 10	Algorithms: Euler's method	Quiz
31	April 12	Algorithms: dynamic programming	Homework 19
32	April 15	Matrix algebra	Homework 20
33	April 17	Inverses, determinants	Quiz
34	April 19	Algorithms: Gaussian elimination	Homework 21
35	April 22	Eigenvalues, eigenvectors	
36	April 24	MIDTERM #2	covers Lectures 18-33

	Date	Main lecture topic	Discussion sections
37	April 26	Least squares	Homework 22
38	April 29	Linear regression	Homework 23
39	May 1	Linear systems of ODE	Quiz
40	May 3	Markov chains	Homework 24
41	May 6	Review	
42	May 8	Review	
	May 15	FINAL EXAM (7-10 pm)	

HOMEWORK AND QUIZZES

*There will be a weekly quiz given each Wednesday in the discussion sections, except for the weeks with midterms. There will be **no** make-up quizzes, but we will drop the two lowest quiz scores in computing your grade.*

Homework will usually be due in the discussion sections on Mondays and Fridays.

TESTS

Test	Date	Material covered
Midterm #1	March 13	Lectures 1-17
Midterm #2	April 24	Lectures 18-33
Final Exam	May 15	All lectures

GRADES

	Percentage of final grade
Homework and quizzes	20%
Midterm #1	20%
Midterm #2	20%
Final Exam	40%

If you do not take Midterm #1, Midterm #2 will count for 40% of your grade. If you take Midterm #1 but not Midterm #2, the Final Exam will count for 60% of your grade. If you take neither Midterm #1 nor Midterm #2, you will fail the course.

We will compute your grade as follows. You will earn a letter grade (with a plus or minus, as appropriate) for each item of work above, and we will later combine these grades as indicated to obtain the final grade for the course. The GSIs will lastly identify borderline cases, for which we will carefully look at the numerical grades on the various tests to determine the grade.

Please save your homeworks, midterms and quizzes, in case questions come up about the grading.

SUGGESTED BOOK

An e-book version of selections from Rosen's text *Discrete Mathematics and Its Applications* (McGraw-Hill) can be purchased online.

The ISBN number for the e-book is 9781121536197 and the price should be around \$35.

I got an emailing saying "Your students can locate and purchase the book online by following these simple steps:

1. Go to <http://create.mcgraw-hill.com/shop/>
2. Search for and select book by Title, ISBN, Author, or State/School.
3. Add the book to your cart and pay using a credit card or access code."