# *IEOR 172: Probability and Risk Analysis for Engineers – Course Syllabus*

## ADMINISTRATIVE INFORMATION

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**Text:** *A First Course in Probability* 8th Ed, 2009  S.M. Ross
  Earlier or later editions ok, but you're responsible for doing the right homework problems.
  Reference: Grinstead and Snell, *Introduction to Probability*  https://math.dartmouth.edu/~prob/prob/prob.pdf

**Prerequisites:** MATH 1A-1B or 16A-16B;  No credit given for this class if you have taken STAT 134.

**Class Time and Room:** TuTh 2-330  LeConte 3 (for now)

**Discussions:** F 4-5 PM, 3107 Etcheverry  or  F 5-6 PM, 3107 Etcheverry

**UC Berkeley Honor Code:** As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.

In fairness to students who put in an honest effort, cheaters will be harshly treated. Any evidence of cheating on an exam will result in a score of zero (0) on that exam. Cheating on the final exam results in an "F" for the course. Cheating includes but is not limited to bringing extra notes or electronic materials into an exam, copying off another person's exam, allowing someone to copy off your exam, and having someone take an exam for you. Incidents of cheating will be reported to Student Judicial Affairs, which may administer additional punishment.

## GRADING

Problem Sets                    15 points
Midterms                        30 points each
Final exam                      50 points
Class participation             5 points

## PROBLEM SETS

Some of the problems, on the weekly problem sets, are quite challenging. I encourage you to work in groups of three to four people, but everyone should turn in individual papers. Since doing problems is the best way to prepare for exams, be sure that you clearly understand any parts that you may have gotten help with. *LATE PROBLEM SETS WILL NOT BE ACCEPTED.* The lowest problem set grade will be dropped. Problem sets on the back of scrap paper are appreciated! (Go Green Bears!)

## EXAMS

There will be two midterms and a final exam. In exceptional circumstances, exams may be taken early but not late. The final will be cumulative and comprehensive. Exams will be closed book, but you may bring one formula sheet (8 ½ by 11, both sides, handwritten) for the first midterm, two for the second, and three for the final. The midterms may be in a different room than the regular classroom.

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| Midterm 1: | Tuesday, September 25 | |
| Midterm 2: | Tuesday, October 30 | |
| Final Exam: | Tuesday, December 11 | 8-11AM |

## COURSE DESCRIPTION AND OUTLINE

This is an introductory probability course for students in engineering, data science, or ORMS. It focuses mostly on random variables and their applications. An important goal is to strengthen intuition about randomness and variability in the real world. Application examples may include reliability, risk analysis, inventory and logistics, computer communications, service systems, and grid computing. We'll follow the book (8$^{th}$ ed) fairly closely:
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| Introduction and Combinatorics | Chapter 1 |
| Skip the proofs of the binomial theorem, example 5d, and section 1.6 | |
| Probability | Chapter 2 (skip 2.6) |
| Conditional Probability and Independence | Chapter 3 |
| Discrete Random Variables | Chapter 4 |
| Continuous Random Variables | Chapter 5 (skip 5.6.2-5.6.4) |
| Random Vectors | Chapter 6 (skip 6.3.2, 6.3.5, 6.6-6.8) |
| Properties of Expectation | Chapter 7 (skip 7.2.1-2, 7.3, 7.8-9) |
| Limit Theorems | Chapter 8 (skip 8.6) |
| Poisson Process | Chapter 9, section 1 |

## ADVICE FROM FORMER IEOR 172 STUDENTS

This course is fast-paced, so study, practice, and study! This is no joke!!

If you have never studied probability this course can turn out to be a big challenge, especially because it takes a whole semester for you to start thinking in probability terms.

If you study a lot in the beginning of the semester, and understand the basics well, the rest of the class is not that difficult.

Attend lecture!!               Definitely go to lecture.

Use lectures as primary material, and use the book more as a backup resource for formulas and examples.

Start early on homework, do extra problems for exams, save your cheat sheets!

Attend class and take good notes because they're very helpful. And go to office hours!

Simply enjoy probability entering your daily life; the world will make more sense after IEOR 172.

I found great questions using Bayes' theorem at http://fivethirtyeight.com/tag/the-riddler/