Math 240 – Probability

Fall Term 2015, Lawrence University

Professor:	Adam Loy
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Office hours:	MWF 8:30–9:30 am, MR 1:30–2:30 pm, and by appointment
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Class time:	MWF 9:50–11:00 am, 422 Briggs Hall
Required text:	J. Blitzstein and J. Hwang, *Introduction to Probability*
Course webpage:	http://math240-lu.github.io/
	Grades will be kept on Moodle

Overview

This course provides a comprehensive introduction to probability, as a language and set of tools for understanding statistics, science, risk, and randomness. Both the mathematical results of the subject and applications to solving problems will be studied, with examples ranging from gambling to genetics. It will cover

- *Basics*: sample spaces and events, conditional probability, and Bayes' Theorem.

- *Univariate distributions*: mass/density functions, expectation and variance, Normal, t, Binomial, Negative Binomial, Poisson, Beta, and Gamma distributions.

- *Multivariate distributions*: joint and conditional distributions, independence, transformations, and the Multivariate Normal distribution.

- *Limit laws*: the law of large numbers and the central limit theorem.

Coursework

1. *Preparation and study*: You must read the assigned sections of the text BEFORE I lecture on them, so that you are already working with the ideas in advance of hearing about them from me. In addition, review your lecture notes after each lecture, carefully reconstructing for yourself the ideas, arguments, and overall story that is developing. Listening to someone else talk for 70 minutes 3 times a week is not sufficient to learn mathematics and reorganize your thought processes.

2. *Class attendance*: During class I will present the major results, prove some of them, provide guided examples and additional practice problems. While I do not strictly require class attendance, I strongly encourage it. Remember that office hours are not substitutes for class attendance.

3. *Problems*: **Solving a lot of problems is an extremely important part of learning probability**. To encourage this I will assign a few problems (∼3-5) each Monday and Friday. The problems assigned on Monday are due Friday by 2:00 p.m., while those assigned Friday are due Tuesday by 4:00 p.m. Problems are due in my office, and NO LATE WORK WILL BE ACCEPTED. You should start working on the problems as soon as they are assigned, and work on them a little (or a lot) every day. While the homework will help you grapple with the material, you may need more practice than the homework provides to master the material. The textbook provides approximately 250 strategic practice problems

throughout the book that are marked with an Ⓢ. Detailed solutions are available for these problems on the course webpage, but you should work hard to solve the problems before looking at the solution.

4. *Exams*: There will be two midterm exams and a final exam. The midterm exams are (tentatively) scheduled for Friday, October 2, and Wednesday October 28, during class. The final exam will be held on Sunday November 22 from 11:30 a.m.–2:00 p.m. The date and time of the final exam is set by the registrar, and under no circumstances will you be allowed to take the final at a different time due to early travel plans.

Evaluation

Problem sets will be worth a total of 40% of your final grade, and your lowest two scores will be dropped. The midterm exams will be worth 15% and 20% of your grade, respectively, and the final exam will be worth 25% of your grade.

Problems will be carefully graded on the following scale:
  5   The solution is essentially perfect and is well-written.
  4   The solution contains a minor error, but no major conceptual errors.
  3   The solution contains numerous minor errors, or a major conceptual error.
  2   The solution contains numerous major conceptual errors.
  1   The solution is incorrect, but shows evidence of serious and relevant thought.
  0   The problem was not attempted or contains no evidence of serious effort.

Honor Code

No Lawrence student will unfairly advance his or her own academic performance or in any way limit or impede the academic pursuits of other students of the Lawrence community.

All students are expected to uphold Lawrence University's Honor Code. All work on exams must be your own. You are encouraged to discuss problems with other students (and me, of course), but you must write your final answers yourself, in your own words. Please indicate on your assignments the names of the students with whom you worked. Solutions prepared "in committee" or by copying or paraphrasing someone else's will be considered a violation of the honor code; your assignments must represent your own thoughts. To check if your homework meets this standard, imagine I asked you to explain your reasoning for each problem—you should be able to do so with ease. All written work must be accompanied by a signed reaffirmation of the Honor Code.

Disability Policy

If you have a documented disability that will impact your work in this class, please contact me to discuss your needs as soon as possible. Additionally, you will need to formally request these accommodations through Student Academic Services. Retroactive requests for accommodations will not be honored.

Healthy Balance

All members of the Lawrence community—students, staff, and faculty—have the responsibility to promote balance in their lives by making thoughtful choices. Balance results from two skills: avoiding imbalance through careful planning, and managing and containing imbalance when it occurs. This course will be demanding, but should not overwhelm your academic (let alone whole) life. If it threatens to, come talk to me, a friend, a counselor, or an advisor.