Statistics 430 Summer 2014
Syllabus

University of Pennsylvania

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Instructor: Josh Magarick

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Course Page: `http://www-stat.wharton.upenn.edu/~magarick/430/index.html`

Location: TBA

Time: Monday-Friday 11AM-12:45PM May 27 - July 2 (Class starts on Tuesday and ends on Wednesday)

Office Hours: TBA

Course Outline

This course presents a mathematical development of probability at a mid-to-high undergraduate level. The emphasis will be a mix of theory and problem solving with plenty of examples to motivate *why* we care about this.

A rough outline of the topics is as follows:

- Sample spaces, outcomes, and events

- Definition of probability

- Conditional probability and Bayes' rule

- Discrete random variables

- Continuous random variables

- Expectation, variance, covariance

- Probability mass functions, density and distribution functions

- Jointly distributed random variables

- Conditional mean, variance of random variables

- Moment generating functions

- The law of large numbers

- The central limit theorem

- Markov's inequality, Chebyshev's inequality

- Convergence in distribution and in probability

- Markov chains (as time permits)

- And more! As time permits...

Prerequisites

It is expected that all students are familiar with calculus on at least the level of math 114. In particular, you should be familiar, and ideally very comfortable with:

- Basic set theory

- Convergence of sequence and series

- Integration (especially by parts) and differentiation

- Multiple integrals

- Linear algebra is not required but would be beneficial.

- Familiarity with the basics of mathematical proofs will extremely helpful.

Course Materials

Textbook: Introduction to Probability, Bertsekas and Tsitsiklis, 2008

Additional Readings: These will be posted on the course page and either consist of excerpts from other books covering material not in the text or examples of applications of probability.

Videos: Either made by me or sourced from the internet, videos provide a supplement to readings. Some will be made by me, others sourced from around the internet. The topics will be similar to those in the text and provided readings.

A note on readings and videos: Often, I will require you to read a section or watch a video before class. It is my hope that in doing so, class can be more talking *with* rather than *at* you and that, in doing so, you better develop your independent learning skills.

Canvas: We will use canvas (`wharton.instructure.com`) for its discussion board and grade book. If you are not in Wharton you will need a Wharton class account (`https://app.wharton.upenn.edu/accounts/class.cfm`).

Evaluation

Homework

There will be several homeworks each week, posted on the course page, for a total of about 15 assignments. Don't let the number scare you; most will be relatively short. The point is to encourage you to stay on top of the class and learn at a measured pace rather than cramming. Why? Because homework

is the most important part of this class. You get out what you put in and no amount of reading or lectures can substitute for spending time working with the material.

You are strongly encouraged to work with other students, since discussing the problems can be a great boon to your understanding. You are not, however, to "work with" other people in the sense of just getting the answers and you must write your own solutions. If you are suspected of copying, I may ask you to come to my office and explain the problem in question to me on the board. If you are actually caught, BAD THINGS will happen. These can range from a zero on the assignment to a referral to the office of academic integrity.

It is better to leave a problem or two unsolved than risk dire consequences. After all there are many homeworks.

You are encouraged to type your homework. To this end, you will receive 5% extra credit on each assignment typed with LATEXand 2% for typing it with anything else.

Late work: You will have three "grace days" over the course of the semester. One you use these up, you may not turn in late assignments. No need to tell me, in advance, just turn it in late. After you have used your three days, no late work will be accepted. Weekends count as one day.

You may drop your lowest three homeworks, but if you don't turn in more than one the 0 will count toward your grade.

Homework Scope: There will be questions that require going beyond the scope what was explicitly discussed in class. You may occasionally need to do some searching to figure out how to do the problem. This is OK, and even encouraged as long as what you search for is not the solution.

Quizzes and Exams

There will be approximately 15 short (15-20 minutes) quizzes at the beginning class. These will be announced beforehand. The questions will be similar to the homework problems.

There may be a comprehensive final exam. It would be an evening on the last week of classes and would count as several quizzes.

You may drop your lowest three quizzes, but if you are going to miss more than two, you need to let me know beforehand and take a makeup quiz or that 0 will be counted.

Participation

Participation entails contributing to the class beyond doing homeworks and exams and being engaged in the learning environment of this class. The more everyone puts in, the more we all get out of the class. Everyone is different, so there are many ways to earn participation points. These include, but are not limited to:

- Asking and answering questions in class.

- Presenting problems and concepts at the board in class.

- Helping other students on the course discussion board.

- Typing up class notes.

- Asking or answering questions during office hours.

Participation does NOT mean "You get points if I call on you in class and you get the right answer."

Grades

- 42% Homework

- 42% Quizzes/Exam

- 16% Participation

Regrades: Due to the quantity and relatively low value of individual assignments, regrades will generally not be accepted. If a problem was marked incorrect but is correct please let me know. But generally quantity of partial credit is not debatable. And the impact on your grade is basically non-existent!