Course Title: Introduction to Probability Theory
Time and Place: TuTh 12:30 - 1:45 PM, MTH 1308
Instructor: Prof. Abram Kagan
Office: MTH 1107, phone x5-5061
Office Hours: TuTh 11 AM - noon or by appointment
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Prerequisite: MATH 240-241 or consent of the instructor

STAT 410 is an introduction to basic concepts and results of probability theory presented with mathematical rigor. After discussing axioms of probability and properties of probability and conditional probability, I’ll turn to random variables and vectors. They will be studied using the moment generating functions, a powerful tool that allows, among other things, to prove the Central Limit Theorem. Distributions of special interest (binomial, Poisson, multinomial, normal, gamma and a few more) will be studied in detail.

The students are responsible for all the material covered in class. Out of respect for other students please no food in the class.

Homework, tests, grading

Homework will be assigned and graded and represent 30% of the total score. Three 75 min exams will be given tentatively on Thursday, September 26, Thursday, October 23, and Thursday, November 20, each representing 10% of the total score. Three quizzes will be given each representing 5% of the total score. The final exam is on Friday, December 19 from 1:30 - 3:30 PM and represents the remaining 25% of the total.

A student who missed an exam/quiz and wants to take the make-up is required to submit a written explanation with supporting documents attached.
Topics to be covered:


- Discrete random variables. Expected value and variance. Basic discrete distributions (binomial, hypergeometric, Poisson, negative binomial) (Weeks 4, 5, 6).

- Continuous random variables. Probability density function. Basic continuous distributions (uniform, normal, exponential, gamma). (Weeks 7, 8).


- Expectation and variance of sums of random variables. Moment generating functions. Conditional expectation and prediction (Weeks 12, 13).

- Chebyshev inequality, Markov inequality, Chernoff bounds, Jensen’s inequality, the Law of Large Numbers (LLN), the Strong LLN, the Central Limit Theorem (Weeks 14, 15).