Syllabus for

BSTA 620: Introduction to Probability

Fall 2019 Class 11:00-12:20 MW, Blockley Hall 701

Instructor Information:

Instructor: Hongzhe Li

Office: 215 Blockley Hall
e-mail: hongzhe@upenn.edu
phone: (215) 573-5038

Office hours: By appointment

TA: Jianqiao Wang (Blockley Hall 107)

e-mail: wangjq@pennmedicine.upenn.edu

Office hour: Thursday 3:30-4:30pm.

Textbook:

Statistical Inference, 2nd ed., George Casella and Roger L Berger

Lecture notes by Douglas Kennedy@ Cambridge University

 (http://trin-hosts.trin.cam.ac.uk/fellows/dpk10/IA/IAprob.html)

Additional lecture notes for special topics

Homework: There will be a total of approximately 10 (almost weekly) problem sets – these will be given by email or posted on Canvas. Most of the problems are from Casella and Berger's book. Full solutions for the homework problems will also be posted on Canvas or provided by email. The best way to succeed in learning the class material is by fully working and understanding the assigned problems.

Exams: There will be a total of 2 exams – 1 midterm and 1 final exam. The exams will be closed-book with one page of notes allowed. The schedule for the exams is

• Midterm exam: October 16, 2019, 11:00am-12:20pm

• Final exam: December 16, 2018, 11:00am-12:20pm

Grading: Your grade is determined by a weighted combination of the homework and the exams according to the following weights:

Homework: 40%, Midterm exam: 20%, Final exam: 30%, Participation: 10%.

Prerequisites: Calculus, Linear Algebra, some Real Analysis

Outline of Topics to be Covered:

This is a fast-paced course that covers probability at graduate levels.

BASIC TOPCIS (Fast paced review).

- Axiomatic Probability
- Conditional Probability and Independence
- Random Variables, Definition, distributions, and expectation
- Discrete Distributions
- Continuous Distributions
- Joint Distributions of Random Variables, Sums of independent random variables, conditional distributions.
- More on Expectations. Expectations of sums, covariance, variance of sums, correlations, conditional expectations.
- Transformation, moment generating function and characteristic function
- Properties of random samples

ADVANCED TOPICS (As many topics as possible)

- Various modes of convergence.
- Limit Theorems Inequalities, weak/strong law of large numbers, central limit theorem
- Useful probability inequalities
- Basic Poisson process.
- Discrete Markov chain.