Mathematical Statistics

Instructor: Dr. Zongming Ma (Email: zongming@wharton.upenn.edu).
Class meeting time: Mon/Wed, 1:30–2:50. The first lecture is on August 28.
Location: JMHH G55.
Office hours: Wed 3–4 @ JMHH 468.

Teaching assistant: Yichen Wang (Email: wangyc@wharton.upenn.edu).
TA office hours: Thu 3–4 @ JMHH F94.

General Information

The purpose of this course is to discuss theoretical aspects of estimation theory and hypothesis testing procedures, together with some of their more important applications. The main topics covered will include estimation theory, including in particular the desirable properties of estimators and how the properties can be achieved, as well as the concepts of sufficient statistics and maximum likelihood estimation, confidence intervals, hypothesis testing theory and the various methods of hypothesis testing and tests involving linear models. The focus of the class is on finding optimal ways of carrying out statistical inference procedures.

Course Prerequisite

It is assumed that each student in the class has taken probability theory to the level of **STAT 430**, a good introductory course in Statistics (e.g., **STAT 102 or STAT 431**), a year of calculus and a good introduction to matrix theory. **Any student not having this background should contact the instructor by email as soon as possible.**

The knowledge of various standard results concerning probability and statistics is assumed. A handout with the title "What you should know" will be handed out in class. Any student not familiar with these standard results should contact the instructor as soon as possible.

Homework, Exam and Assessment

Homework problems will be handed out every other week on Mondays in class, and are due in a week later, in class. There are six problem sets in total. A random half of the problems in each set will be graded. Solutions to all problems will be handed out in class.

There is an in-class midterm exam on **Wednesday, October 16**, and a take home final exam (**December 10 noon–December 11 noon**). **Any student who cannot make the midterm exam should not enroll. Final grades are given based on 30% homework + 30% midterm + 40% final exam performance.**

Textbook and references

The class has no required textbook. Lectures are self-contained, and students are expected to take notes. Additional materials are given as handouts when necessary.

The following books serve as good references, but neither is required. Their levels are slightly above that of the class.

- "Introduction to Mathematical Statistics" by Hogg, McKean, and Craig;

- "Statistical Inference (2nd edition)" by Casella and Berger.