Advanced Statistics, MA 588-688-P0 Summer 2023

Class meets MWF, 2:40-4:00, UH 4002

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Text: Regularly distributed class notes
Grading policy:

Homework	30 %
Midterm Exam	30 %
Final Exam	40 %

Homework: Problems will be assigned weekly on Fridays, unless announced otherwise. Homework will be due the next Friday after assignment. One (the lowest) homework score will be dropped. You can use any software (including MATLAB) for doing homework problems.

All tests in this course are **open-notes**. You may use a calculator, and you will actually need one. A class attendance roll will be circulated each time. The number of unexcused absences cannot exceed 20% of the classroom meetings in order to get a passing grade.

General goals:

The course will aim at fundamental principles of statistics and logic behind it. Its purpose is not a detailed coverage of standard statistical routines and procedures. The purpose will be to present a "big picture" and place standard methods into a proper context, to show their advantages and limitations. We will also learn how to adjust and modify existing methods to suit somewhat unusual applications and how to design and develop new statistical methods for very unusual applications.

Prerequisites:

The most important will be a good knowledge of probability. The first probability course, MA 485/585 (or its equivalent) is a must. Students who took Advanced Probability, MA 587/687, should be well prepared. Having taken statistics MA 486/586 will be useful, too, but not absolutely necessary.

Tentative content:

Point estimation, unbiased estimators, variance and mean squared error, covariance matrix and scatter ellipsoid, Cramer-Rao inequality, efficiency, maximum likelihood estimates, consistency and other asymptotic properties (such as normality and efficiency of the MLE), sufficient statistics, factorization criterion, general theory of hypothesis testing, Neymann-Pearson lemma, likelihood ratio tests, testing normality hypothesis, Bayesian statistics.

Welcome to my MA 692 class, and best of luck to you all!