Mathematical Statistics

DE-7600044, Fall 2025

Engineering Building 207–10515, Mon 15:00–17:45

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Office: Engineering Building 207–10527
Office Hours: 12:00–13:00pm (Mon/Wed) or by appointment.

Textbook *Probability and Statistical Inference* by Hogg, Tanis, and Zimmerman. Pearson, 9th edition (2014).

Web Page https://AppliedStat.GitHub.io/class

Software *R Language* (http://www.r-project.org).
Maple (http://www.maplesoft.com).

Prerequisite Undergraduate-level statistics course is required. (The expectation is that you have already been exposed to the basic probability and statistics).

Policy

- Attendance Policy: Class attendance is mandatory. If you miss a class for some reason, it is your responsibility to get notes, *etc.* from someone in the class. I will not repeat lectures during my office hours.
- Tardy Professor Policy: If the instructor has not arrived within 15 minutes of the scheduled class time, you may assume that class has been canceled.
- All drop/add procedures are your responsibility.

Description and Learning Objectives

– Mathematical Statistics will focus on the theories of statistics.

– First Topics (probability part) covered in this class include basic distribution theories and various probability distributions such as binomial, negative binomial, Poisson, exponential, normal, bivariate, etc.

– Second Topics (statistics part) covered in this class include point estimation, interval estimation, sampling, linear regression, and statistical hypothesis testing.

– We will also study various statistical applications widely used for engineering. The popular R statistical language or Rstudio will be handled in this class.

Upon successful completion of this course, a student will be able to:

- Understand basic concepts on probability theories.
- Obtain basics on discrete and continuous distributions.
- Obtain conditional distributions.
- Obtain bivariate distributions.
- Obtain various approximation technique.
- Understand basic concepts on statistics theories.
- Obtain point estimates.
- Obtain interval estimates.
- Understand basic sampling techniques.
- Obtain a simple linear regression estimate.
- Construct various statistical hypothesis testing.
- Learn how to program basic statistical programs using R language.

Grading

The final grade will be curved and calculated as follows:

Homeworks:	5%
Attendance:	5%
Midterm	45%
Final:	45%

Rough Grading Guide:

- A+: 95 ∼ 100 A: 90 ∼ 95-
- B+: 85 ∼ 90- B: 80 ∼ 85-
- C+: 70 ∼ 80- C: 60 ∼ 70-
- D+: 50 ∼ 60- D: 40 ∼ 50-
- F : below 40.

Exams

Midterm: T.B.A In class
Final: T.B.A

- For the final exam (not for the midterm), you are allowed to bring in *one* A4-size formula sheet made up by yourself.
- The final exam will be comprehensive.
- During the exams, a basic calculator will be permitted but cannot be shared with others.
- Calculators in smart phones, tablet PC and laptops are prohibited.
- No early or late exams will be allowed without a written and legitimate excuse.

Homeworks

- The students can collaborate on their homework problems, but they should submit their homeworks separately.
- Late homeworks will **not** be accepted.
- Up to 1 ∼ 2 problems, selected at random, will be graded in detail, on a scale of 0–5 each.
- To get full credit, you must show all work on the homework problems, which must be handed in in the same order as they are assigned.

Tentative Schedules

1 Reviews on Engineering probability theories.
2 Distributions with several random variables.
3 The central limit theorem.
4 Introduction to point estimation.
5 Descriptive statistics.
6 Order statistics.
7 MLE (Maximum Likelihood Estimation).
8 Simple regression model
9 Introduction to confidence interval.
10 Confidence interval for means.
11 Confidence interval for the difference of two means.
12 Confidence interval for proportions.
13 Introduction to statistical hypothesis test.
14 Statistical hypothesis test about one or two means.
15 Statistical hypothesis test about proportions.
16 Final Exam