Syllabus for Math 472: Statistical Inference

Spring 2026

1 Course description

1.1 Locations and Times

Instructor: Max Hill
Office Hours: 9:00-10:00am Tuesday and Friday (or by appointment) at Physical Sciences Building 304
Class location and time: Keller Hall 313 at 10:30-11:20am (MWF)
Course website: `https://max-hill.github.io/math-472/`
Textbook: *Mathematical Statistics with Applications*, by Wackerly, Mendenhall, and Scheaffer, (7th ed. 2008).

1.2 Prerequisites

The official prerequisites are MATH 472 or instructor consent. In practice, you will need to have had some exposure to probability theory, proof writing, and multivariate calculus.

1.3 Learning objectives

This course is intended to introduce you to the art of mathematical statistics either in preparation for (1) further graduate-level study or (2) application in careers in industry involving statistics, data science, or analytics. We will focus on mathematical tools used in classical (i.e., frequentist) statistics developed in the first half of the 20th century. At a high level, my hope is for this course to begin a process of demystifying the techniques, capabilities, and limitations of mathematical statistics. You will learn standard terminology, key objects, frameworks, and methods. You will be better at writing proofs and performing sophisticated, multi-stage computations. You will learn the basics of the statistical software `R`.

1.4 Tentative course outline

1. **Weeks 1-2.** Sampling distributions (4 lessons).
   chi-squared, t, and F distributions, distributions of sample mean and variance
2. **Weeks 3-4.** Point estimation (5 lessons)
   properties and methods of point estimation
3. **Weeks 5-6.** Interval estimation (4 lessons)
   Confidence intervals for means, variances, proportions and differences
4. **Weeks 7-12.** Hypothesis Testing (19 lessons)
   Neyman-Pearson lemma, likelihood ratio test; tests concerning means and variances, tests based on count data, nonparametric tests, analysis of variance
5. **Weeks 13-14.** Regression and correlation (6 lessons)
   regression, bivariate normal distributions, method of least squares

2 Important Dates

Non-instructional days are January 19, February 16, March 16-20.

Midterm 1	Wednesday, Feb 18 (in class)
Midterm 2	Friday, March 27 (in class)
Final exam	Friday, May 15 at 9:45-11:45am

The last day of instruction is May 6.

3 Grading

Final grades will be computed as a weighted average of the following three categories:

- **homework (20%)** Homeworks will be due approximately weekly. I will incorporate coding elements into the homework, using the statistical software `R`. This is the most widely-used statistical software. This is something you will be able to put on your cv/resume.

  You have one 'no questions asked' homework estension.

- **quizzes (10%)** There will be regular in-class quizzes in which I ask you to state precise mathematical definitions. These quizzes will be only a few minutes.

  You can retake up to two quizzes in office hours.

- **exams (70%)** There are two midterms (17.5% each) and one final exam (35%). All exams will be closed-book, and my include some homework problems. The final exam will be cumulative.

  Make-up exams are allowed only in three types of circumstances: (1) in accordance with university policies, such as conflict with a religious observation, (2) conflicts with another university-related event, or (3) exceptional circumstances, such as a last-minute medical or family emergency with verification. In the first two cases, notice must be given to the instructor two weeks in advance.

The following grade cutoffs will be used at the end of the semester to determine final grades:

D	D+	C-	C	C+	B-	B	B+	A-	A	A+
60%	67%	70%	73%	77%	80%	83%	87%	90%	93%	97%

4 Other policies

4.1 Collaboration and outside resources

You may collaborate with classmates on the homeworks. But if you do so, you must (1) make an effort write up your solutions on your own, using your own words, and (2) list the names of those who you worked with.

Use of outside resources is allowed but must be cited, in the sense that you need to tell me what you used and how you used it. I do not know how best to use AI tools to increase learning, so this is something I'd like you to think about over the course of the semester, and give me feedback if you have any.

4.2 Incompletes

An incomplete is possible only if all of the following apply: (1) you have a compelling personal reason, e.g., serious illness or accident (a proof, e.g., report from a doctor or police must be shown); (2) your work so far would receive a passing grade; and (3) there is a good chance you will complete the course with a passing grade within the allotted time. Thus, expecting to fail the class is not a reason to ask for an incomplete.

4.3 Accommodation statement

The University of Hawai'i, Mānoa is committed to providing an equal educational opportunity for all students. A student with a documented physical, psychological, or learning disability on file with KOKUA Program (Disability Access Services, `http://www.hawaii.edu/kokua/`) may be eligible for reasonable academic accommodations to help succeed in this course. If you have a documented disability that requires an accommodation, please ask KOKUA office to notify the instructor within the first two weeks of the semester in order to make appropriate arrangements.