Syllabus for Math 372: Elementary Probability and Statistics

Spring 2026

Instructor: Max Hill
Office: Physical Sciences Building 304
Office Hours: TBD (or other times by appointment).
Course website: `https://max-hill.github.io/math-372/`

Place and time: Web 113 at 12:30-1:20pm (MWF)

Textbook: *Probability and Statistics for Engineering and the Sciences* by Jay L. Devore (9th edition). ISBN-13: `978-1-305-25180-9`

Course prerequistes: Math 216 or Math 242 or Math 252A. If you don't meet the prerequisites, you'll need to get approval from the math department office.

Exams: There will be two midterms and a final exam. The final will be cumulative, but will emphasize material after the midterm. The exam dates are as follows:

Midterm 1 ..... Wednesday, Feb 18 (in class)
Midterm 2 ..... Friday, March 27 (in class)
Final exam ..... Friday, May 15 at 12:00-2:00pm

Grading: Homework (20%), Midterms (40%), Final (40%). 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%

Homework: Homework will be a mix of worksheets/short in-class quizzes and written assignments.

- You have one free 'no questions asked' homework extension.
- 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 the people who you worked with.

Make-up policy: 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.

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.

Accommodations: Any student who feels s/he may need an accommodation based on the impact of a disability is invited to contact me privately. I would be happy to work with you, and the KOKUA Program (Office for Students with Disabilities) to ensure reasonable accommodations in my course. KOKUA can be reached at (808) 956-7511 or (808) 956-7612 (voice/text) in Room 013 of the Queen Lili'uokalani Center for Student Services.

Tentative course outline: This course is a problem-oriented introduction to the basic concepts of probability and statistics, providing a foundation for applications and further study.

- **Weeks 1-2:** Introduction to probability theory
  - Experiments, events, sets, probabilities, random variables. Equally likely outcomes, counting techniques. Conditional probability. Independence. Bayes' theorem. (Sections: 2.1-2.5)
- **Weeks 3-5:** Random variables
  - Discrete random variables (1.5 weeks): Expected values, mean, variance, binomial distribution, Poisson distribution. Moment generating functions. (Sections: 3.1-3.6)
  - Continuous Random variables (1.5 weeks): Uniform, exponential, gamma, and normal distributions. Intuitive treatment of the Poisson process and development of the relationship with gamma distributions. (Sections: 4.1-4.4)
- **Midterm 1 (Feb 18)**
- **Weeks 6-7:** Multivariate distributions
  - Calculation of probability, covariance, correlation, marginals, conditions. Distributions of sums of random variables and sampling distributions. Central limit theorem. (Sections: 1.1, 1.3, 1.4, 5.1-5.7)
- **Week 8:** Catch-up, review.
- **Week 9:** Introduction to statistical estimation
  - Point and confidence interval estimation. Maximum likelihood, optimal, and unbiased estimators. Examples. (Sections 6.1, 6.2)
- **Midterm 2 (March 27)**
- **Weeks 10-12:** Large sample inference
  - Estimation (1.5 weeks): Types and comparison of estimators; sampling distributions for means/proportions, and their use in large sample estimation; sample size. (Sections 7.1, 7.2)
  - Hypothesis testing (1.5 weeks): Components of a test; signficance and power; p-values; large-sample tests for means and proportions (Sections: 8.1-8.4)
- **Week 13:** Small sample inference
  - t-distribution, with applications to small sample estimation and testing; χ^2 and F distributions, with applications to inference about variances (Sections: 7.3, 7.4, 8.3)
- **Weeks 14-16:** Regression and χ^2 tests
  - Regression (1.5 weeks): Least squares, correlation coefficient, inference (Sections: 12.1-12.5)
  - χ^2 tests: multinomial dsitributions, contingency tables, goodness-of-fit (Sections: 14.1-14.3)
- **Last day of instruction: May 6**
- **Final Exam: May 15**