

STAT 343: Probability and Statistics

Syllabus, Fall 2023

Course Information.

- 4 semester hours
- Professor: Thomas Scofield
- Prerequisites: MATH 172 or a B- in MATH 132; MATH 231 or MATH 251; or permission of the instructor
- Text: *Foundations and Applications of Statistics: An Introduction using R*, 2nd Ed., by Randall Pruim
- Class meetings: MWF, 11:00–12:05, NH 259

Catalog Description.

Probability, probability density functions, binomial, Poisson, and normal distributions, central limit theorem, limiting distributions, sample statistics, hypothesis tests, and estimators.

Student Learning Outcomes. Upon completion of this course, students will be able to

- Reason and communicate about and with data.
- Use data to estimate unknown quantities and quantify the precision of these estimates.
- Use data to test statistical hypotheses.
- Apply calculus and linear algebra in probabilistic and statistical contexts.
- Use mathematical techniques and results to derive properties of probability distributions.
- Use a statistical programming language (R) to explore and summarize data and perform numerical computations.
- Use simulations to explore distributions and their properties.

Topics.

1. Discrete and continuous probability distributions
 - (a) Definitions
 - (b) Moments (especially mean and variance)
 - (c) Important examples (such as binomial, negative binomial, hypergeometric, Poisson, uniform, normal, gamma, Chi-square, t, F) and their properties
 - (d) Use of distributions as models
 - (e) Deriving information about distributions from modeling situations
2. Moment generating functions
3. Central Limit Theorem

4. Hypothesis tests
5. Estimators and confidence intervals

Methods of Evaluation.	<u>Assessment</u>	<u>Pct</u>
	Homework assignments	25%
	Midterm tests (Oct. 11 and Nov. 29)	44%
	Final (Dec. 12, at 9 am)	31%

Policies.

- You are expected to attend class faithfully, in person, ready to go as class begins. When you cannot, regardless of reason, you are responsible for catching yourself up.
- Written work should be neat and well-organized, legibly written (if not typeset using Quarto) in complete sentences, and providing justification in the form of reasoning and mathematical or computational work/plots with shared code. You are expected to be aware of assignments and their due dates. If you are unable to submit work by the due date, you may use one of your allotted late passes in MyOpenMath, adhering to the extra time it provides, until such time that you have used up your passes.
- Unless directed otherwise on specific assignments, you may freely collaborate with classmates as you explore problems. Your write-ups are to be your own, however. Sections grafted from another student's work shall be considered *cheating*, and shall result in a score of zero. Repeated instances shall result in a course grade of "F".
- You are expected to take exams on the dates specified, or provide sufficient cause why you cannot. Family trips, pre-arranged flights, etc. are *not* sufficient.

Accommodations. Calvin University is committed to providing reasonable accommodations for students with documented disabilities. Students with disabilities requiring special assistance to facilitate participation in this class are urged to contact Disability Services in the Center for Student Success (disabilityservices@calvin.edu) as soon as possible to explore such arrangements.

Exceptions. I reserve the right to make changes or exceptions to course policies, including those described in this document, either for the entire class or for individuals. The ultimate goal in this course is **learning**, and formal requirements should not unnecessarily stand in the way of that. Thus, if you think that any of the conditions of the course are interfering with learning, please speak with me about this, and we will consider what can be done.