

STAT 345/445, PQHS 481: Theoretical Statistics I
Case Western Reserve University, Fall 2024

Time and Place: Tue/Thu 2:30 - 3:45, Nord Hall 204

Instructor: Dr. Jenny Brynjarsdottir, email: jenny.brynjarsdottir@case.edu

Office location: 2145 Adelbert Road, room 202C

Office hours: Tuesdays 12:30 - 1:30pm and Thursdays 4:00 - 5:00pm, and Fridays by appointment

Grader: Graceanne Paz, graceanne.paz@case.edu

Prerequisites:

MATH 122 or MATH 223 or Coreq: PQHS/EPBI 431. Offered as STAT 345, STAT 445 and PQHS 481.

Required Textbook

Statistical Inference (Second Edition), by George Casella and Roger L. Berger.

Course Topics

The objective of this course is to introduce to students the basic theory of probability and probability distributions, which is fundamentally important for understanding commonly used statistical concepts and methods. This course also provides students a necessary basis for a further study of advanced statistical courses. We plan to cover the following topics from the textbook.

- Probability Theory
 - Set Theory, Basics of Probability Theory, Conditional Probability and Independence, Random Variables, Distribution Functions, Density and Mass Functions
- Transformations and Expectation
 - Distributions of Functions of a Random Variable, Expected Values, Moments and Moment Generating Functions
- Common Families of Distributions
 - Discrete Distributions, Continuous Distributions, Exponential Families, Location and Scale Families, Inequalities and Identities
- Multiple Random Variables
 - Joint and Marginal Distributions, Conditional Distributions and Independence, Bivariate Transformations, Hierarchical Models and Mixture Distributions, Covariance and Correlation, Multivariate Distributions
- Properties of Random Samples
 - Sums of Random Variables, Distributions derived from the Normal Distribution, Order Statistics

Homework

Homework will be assigned almost every week when there is not a Quiz or Midterm Exam scheduled.

See the schedule on Canvas for due dates. The assignment will be posted on Canvas and we will experiment with using Gradescope. Please type your assignment or write clearly. You could use this opportunity to learn LaTeX! You have to show all your work; no credit will be given for only writing the final answer.

Schedule

A tentative schedule of reading and homework assignments are on Canvas - updated regularly so check often.

Students registered as STAT 445 or PQHS 481

A higher level of mathematical rigor is expected from graduate students. Homework, exams, and quizzes will include different and/or extra problems.

Assignments, Exams, and Grades

Homework	15%	There will be 8 homework assignments over the semester worth a total of 80 points. Your points will be tallied in the end and your score will be out of 70 points. (Similar effect as lowest score does not count towards your grade).
Quizzes	25%	There will be four 30-min in-class quizzes worth a total of 80 points. Your total score will be out of 60 points.
Midterm Exam	30%	There is always hope rule: If your grade on the Final Exam is higher than your grade on your Midterm Exam, your Final Exam grade will override your Midterm grade (but not the other way around, Midterm grade cannot override the Final Exam grade).
Final Exam	30%	

See schedule for dates. Grades will be posted on Canvas.

Tentative grading scale: $A \in [90, 100]$, $B \in [80, 90)$, $C \in [70, 80)$, $D \in [60, 70)$, $F \in [0, 60)$.

Academic Integrity

Students at Case Western Reserve University are expected to uphold the highest ethical standards of academic conduct. Academic integrity addresses all forms of academic dishonesty, including cheating, plagiarism, misrepresentation, obstruction, and submitting without permission work to one course that was completed for another course. Please review the [complete academic integrity policy](#). Any violation of the policy will be reported to the Dean of Advising in Undergraduate Advising Support and the Office of Student Conduct & Community Standards.

Disability \neq INability

In accordance with federal law, if you have a documented disability, you may be eligible to request accommodations from Disability Resources. In order to be considered for accommodations, you must first register with the Disability Resources office. Please contact their office to register at 216.368.5230 or [get more information](#) on how to begin the process. Please keep in mind that accommodations are not retroactive.