

STAT 642: Advanced Probability Theory

Spring 2020

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Office hours: R 12 - 1 pm, F 1-2:30 pm

Prerequisites: STAT 641, or STAT 543 and MATH 515

Lecture: TR 2:10-3:30 pm, Durham 0171

Textbook: *Measure Theory and Probability Theory* by K. B. Athreya & S. N. Lahiri, Springer text in statistics, 2006.

Other Useful

- References:**
1. *Probability and Measure*
- by P. Billingsley (Wiley-Interscience, 1995)
 2. *A Probability Path*
- by S. I. Resnick (Birkhäuser, 1999)

Course Description: The course will generally cover the following topics:

- Independence (Chapter 7)
- Laws of Large Numbers (Chapter 8)
- Convergence in Distribution (Chapters 9-10)
- Central Limit Theorems (Chapter 11)
- Conditional Expectation (Chapter 12)
- Discrete Parameter Martingales (Chapter 13) (Time Permitting)

Course Information

Objectives: The goal of this course is to develop a deeper understanding of probability tools, which are often needed for better understanding of the currently available statistical methodologies as well as for building better statistical methods. We emphasize several concepts in probability theory (e.g., independence, laws of large numbers, convergence in distribution, conditional expectation) that are commonly used to justify, develop and communicate statistical methods. The presentation of the material emphasizes the mathematical details of probability that impart a scientific rigor and credibility to “statistics” as a discipline.

ISU Canvas: Students can keep track of their grade scores and access all other class material through a Canvas page for STAT 642.

Exams: There will be two midterm exams and a final exam. Each midterm will most likely be administered at an evening time (e.g., 6-8 PM on a Thursday). If you know that you have a conflict with an exam due to circumstances beyond your control, you must notify me **before** the scheduled exam. Make-up exams are permitted only at the instructor’s discretion.

Homework: Weekly homework problems will be assigned throughout the semester to provide opportunities for practice and application (typically due Fridays with some schedule changes around exams). Both the homework problems and their solutions will be posted on the course website in Canvas. You are welcome to discuss the homework problems with other students but everyone must *independently* write up and submit a homework assignment. Late homeworks will not be accepted.

Grading: Grades will be based on the following criteria:

Component	Weight	Tentative Date
Homework	10%	
Exam 1*	25%	Thursday, February 20, 6:00-8:00 PM Snedecor 3105
Exam 2*	25%	Tuesday, March 24, 6:00-8:00 PM Snedecor 3105
Final Exam	40%	Tuesday, May 5, 2:15- 4:15 PM Durham 0171

* Please note that the dates for the midterm exams are tentative and may be changed based on the pace of the course. The final exam date/time are set by the university. You will always be given sufficient notice of an exam. Locations of exams are to be announced.

General ISU Policies for this Course

Accessibility Statement

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

Academic Dishonesty: The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office.

Dead Week (the last week of the semester prior to final exam week)

This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook. (Essentially, no final exams are allowed in dead week, and no graded submissions of any kind can have due dates in dead week without first informing students at the start of the semester. This is a non-issue in STAT 642, as neither homeworks nor exams will be given/due in this week.)

Harassment and Discrimination

Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance at 515-294-7612.

Religious Accommodation

Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request the reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the Dean of Students Office at 515-294-1020 or the Office of Equal Opportunity at 515-294-7612.

Contact Information for any Issues Above

If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.