暨南大學 JINAN UNIVERSITY

2023

0701M320

Introduction to Probability

Instructor: TBA

Time: October 16, 2023 - November 17, 2023

Office Hours: by appointment

Contact Hours: 60 (50 minutes each)

Credits: 4

Course Description

This course is to introduce the language and core concepts of probability theory. Topics including probability spaces, random variables, independence, conditional expectation and probability, joint distributions, consequences, the Central Limit Theorem, conditional distribution.

Textbooks

Probability and Simulation, Giray Ökten, Springer Undergraduate Texts in Mathematics and Technology, Springer, 2020. Softcover ISBN: 978-3-030-56069-0. E-book ISBN: 978-3-030-56070-6

Introduction to Probability, David F. Anderson, Timo Seppäläinen, and Benedek Valkó; ISBN: 978110841585

Prerequisite

0701M230 Calculus II

Course Outline

Chapter 1 Probability (Chapter 1 of *Probability and Simulation*)

- 1.1 Axioms of probability
- 1.2 Random sampling
- 1.3 Project: Verifying polynomial identities
- 1.4 Conditional probability and randomized surveys
- 1.5 Bayes' theorem

Chapter 2 Discrete random variables (Chapter 2 of *Probability and Simulation*)

- 2.1 Discrete random variables
- 2.2 Expectation of a function of a random variable
- 2.3 Discrete unform random variables
- 2.4 Bernoulli, binomial, geometric, Poisson random variables
- 2.5 Conditional expectation
- 2.6 Markov's inequality and Chebyshev inequality

Chapter 3 Continuous random variables (Chapter 3 of *Probability and Simulation*)

- 3.1 Uniform random variables and strong law of large numbers
- 3.2 Exponential and normal random variables, central limit theorem

Chapter 4 Joint distribution of random variables (Chapter 6 of *Introduction to Probability*)

- 6.1 Joint distribution of discrete random variables
- 6.2 Jointly continuous random variables
- 6.3 Joint distributions and independence
- 6.4 Further multivariate topics

Chapter 5 Sums and symmetry (Chapter 7 of *Introduction to Probability*)

- 7.1 Sums of independent random variables

Chapter 6 Expectation and variance in the multivariate setting (Chapter 8 of *Introduction to Probability*)

- 8.2 Sample mean and sample variance
- 8.4 Covariance and correlation
- 8.5 The bivariate normal distribution
- 8.6 Finer points

Chapter 7 Topics from conditional distributions and jointly continuous random variables (Chapter 10 of *Introduction to Probability*)

- 10.1 Conditional distribution of a discrete random variable
- 10.2 Conditional distribution for jointly continuous random variables
- 10.3 Conditional expectation

Chapter 8 Moment generating functions (Sections 5.1 and 8.3 of *Introduction to Probability)*

- 8.1 Moment generating functions: discrete random variables
- 8.2 Moment generating functions: continuous random variables
- 8.2 Moment generating functions of sums of independent random variables

Grading Policy

Three Homeworks	45%
Midterm	25%
Final Exam	30%
Total	**100%**

Homework: There are three homework assignments. Students can work on the assignments together and share ideas, but each student should present their own work in their solutions.

Midterm Exam: The exam is based on topics covered during the first two weeks.
Final Exam: The all-inclusive final exam is on the last day of the semester.

Both the midterm and the final exam in this course must be visually proctored. For most students, that will mean visual proctoring via Zoom where students will be required to show their immediate testing area to the proctor. Students may also use an approved Testing Center at a college or university if online proctoring is unsuitable. Contact the instructor at the beginning of the semester if you need an alternative to online proctoring.

Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90~100
Good	B	80~89
Satisfactory	C	70~79
Poor	D	60~69
Failed	E	Below 60

Academic Integrity

As members of the Jinan University academic community, students are expected to be honest in all of their academic coursework and activities. Academic dishonesty,

includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e., misrepresenting as one's own work any work done by another; submitting the same paper, or a substantially similar paper, to meet the requirements of more than one course without the approval and consent of the instructors concerned; or sabotaging other students` work within these general definitions. Instructors, however, determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties that range from the lowering of their course grade to awarding a grade of E.