暨南大學
JINAN UNIVERSITY

0701M320

Introduction to Probability

Instructor: TBA

Office Hours: By appointment

Contact Hours: 60 (50 minutes each)

Credits: 4

Email: TBA

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.

Course Goals

By the end of the course, students will be able to:

- Moel and analyze real-world problems using probability theory, including discrete and continuous random variables, conditional probability, and key probability distributions.
- Compute and interpret expectations, variances, covariances, and moment generating functions, and apply major results such as the Law of Large Numbers and the Central Limit Theorem.

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

Please note that the outline is meant to give an overview of the major concepts in this course. Changes may occur as needed to aid in the student`s development.

Module 1: Probability (Chapter 1 of Probability and Simulation)

- Topics:
  - 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
- Module quiz

Module 2: Discrete random variables (Chapter 2 of Probability and Simulation)

- Topics:
  - 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

- Module quiz
- Homework 1

Module 3: Continuous random variables (Chapter 3 of Probability and Simulation)

- Topics:

  3.1 Uniform random variables and strong law of large numbers

  3.2 Exponential and normal random variables, central limit theorem

- Module quiz
- Midterm exam

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

- Topics:

  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 Module quiz

- Module quiz
- Homework 2

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

- Topics:

  7.1 Sums of independent random variables

- Module quiz

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

- Topics:

  8.2 Sample mean and sample variance

  8.4 Covariance and correlation

  8.5 The bivariate normal distribution

  8.6 Finer points
- Module quiz
- Homework 3

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

- Topics:

  10.1 Conditional distribution of a discrete random variable

  10.2 Conditional distribution for jointly continuous random variables

  10.3 Conditional expectation
- Module quiz

Module 8: Moment generating functions (Sections 5.1 and 8.3 of Introduction to Probability)

- Topics:

  8.1 Moment generating functions: discrete random variables

  8.2 Moment generating functions: continuous random variables

  8.3 Moment generating functions of sums of independent random variables 、
- Module quiz
- Final Exam

Grading Policy

Three Homeworks	40%
Module quizzes	5%
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.

Module Review Quiz: Each module includes a quiz to help students review the topics of the module.

Midterm Exam: The midterm is based on topics covered during the first three Modules.

Final Exam: The final exam is an all-inclusive exam. The final exam will be proctored online.

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.