MATH 244: Introduction to Probability Theory
Spring 2025 Course Syllabus

NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: Topics include basic probability theory in discrete and continuous sample space, conditional probability and independence, Bayes' theorem and event trees, random variables and their distributions, joint distribution and notion of dependence, expected values and variance, moment generating functions, useful parametric families of distributions including binomial, geometric, hypergeometric, negative binomial, exponential, gamma, normal and their applications, simple case of central limit theorem and its uses.

Prerequisites: MATH 112 with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 244-002	Professor C. Kim

Office Hours for All Math Instructors: Spring 2025 Office Hours and Emails

Required Textbook:

Title	*Probability and Statistics for Engineers and Scientists, MyLab Statistics*
Author	Walpole
Edition	9th
Publisher	Pearson
ISBN #	ISBN-13: 9780134115856 (Hardcover) ISBN-13: 9780134437620 (Digital)

E-book option: https://www.pearson.com/store/en-us/pearsonplus/p/9780137273546.html

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 7, 2025**. It will be strictly enforced.

COURSE GOALS

Course Objectives:

- Understand the basic principles of probability including laws for unions, intersections, and complements, as well as Bayes' theorem, and use them to calculate probabilities.
- Understand the definitions of discrete and continuous random variables and their distributions (including joint, marginal, and conditional distributions), compute expectation, variance, covariance, and correlation of random variables, know the definitions of density and distribution functions of random variables, and be able to compute them.
- Learn about uniform, binomial, multinomial, geometric, hypergeometric, Poisson, negative binomial, normal, exponential, and gamma random variables, know their distributions and parameters, and understand when to use them.
- Become familiar with moment generating functions, transformation techniques, and basic limit theorems in probability, including the law of large numbers and the central limit theorem.

Course Outcomes: On successful completion students will

- have a greater understanding of central concepts and ideas in probability, in particular random variables and their distributions, and have learnt how to interpret probabilistic statements;
- be able to solve introductory level and more challenging problems that involve randomness and chance;
- be prepared for more advanced mathematics and statistics courses.

Course Assessment: Will be based on weekly homework and quizzes, two midterm exams, and one (comprehensive/cumulative) final exam.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. DMS takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Quizzes/Worksheets	30 %
Midterm Exam	30 %
Final Exam	40 %

Your final letter grade will be based on the following tentative curve.

A	90 - 100	C	65 – 74
B+	85 - 89	D	50 – 64

B	80 - 84	F	0 – 49
C+	75 – 79		

Attendance Policy: Attendance at all classes will be recorded and is **mandatory.**

Calculator: You need a scientific calculator for this course. **Graphing calculators are not allowed.**

Quiz/Worksheet Requirements: Attendance at all quizzes, worksheets, and exams is mandatory

Exams: One midterm and one final examination will be given as shown below. The midterm exam date is tentative and may be subject to change.

Midterm Exam	March 14 (Friday), 2025
Final Exam Period	May 10 - May 16, 2025

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the Math Department's Examination Policy. This policy will be strictly enforced.

Makeup Exam Policy: There will be **NO MAKE-UP QUIZZES OR WORKSHEETS OR EXAMS** during the semester. In the event an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam will be missed. In this case, the final exam score will take the place of the missed exam.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Spring 2025 Hours)

Further Assistance: For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department's webpage for Instructor Office Hours and Emails.

Accommodation of Disabilities: The Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please If you need an accommodation due to a disability please contact the Office of Accessibility Resources and Services at oars@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and Services office authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Office of Accessibility Resources and Services (OARS) website at:

https://www.njit.edu/accessibility/

Important Dates (See: Spring 2025 Academic Calendar, Registrar)

Date	Day	Event
January 21, 2025	Tuesday	First Day of Classes
January 27, 2025	Monday	Last Day to Add/Drop Classes
March 16, 2025	Sunday	Spring Recess Begins
March 22, 2025	Saturday	Spring Recess Ends
April 3, 2025	Thursday	Wellness day
April 7, 2025	Monday	Last Day to Withdraw
April 18, 2025	Friday	Good Friday - No Classes
April 20, 2025	Sunday	Easter Sunday - No Classes Scheduled
May 6, 2025	Tuesday	Thursday Classes Meet
May 7, 2025	Wednesday	Friday Classes Meet
May 7, 2025	Wednesday	Last Day of Classes
May 8, 2025	Thursday	Reading Day 1
May 9, 2025	Friday	Reading Day 2
May 10 - May 16, 2025	Friday to Thursday	Final Exam Period

Course Outline (tentative)

Week	Lecture	Sections	Topic
1	1/21 (T)	2.1-2.3	Sample space, events, Counting
1	1/24 (F)	2.1-2.3	Counting – continued
2	1/28 (T)	2.4	Probability of an Event

2	1/31 (F)	2.5	Additive Rules
3	2/4 (T)	2.6	Conditional Probability, Independence
3	2/7 (F)	2.6	Product Rules
4	2/11 (T)	2.7-2.8	Bayes Rule
4	2/14 (F)	3.1	Concept of Random Variable
5	2/18 (T)	3.2	Discrete Probability Distributions
5	2/21 (F)	3.3	Continuous Probability Distributions
6	2/25 (T)	3.3	Continuous Probability Distributions – continued
6	2/28 (F)	3.4-3.5	Joint Probability Distributions
7	3/4 (T)	3.4-3.5	Joint Probability Distributions – continued
7	3/7 (F)	4.1-4.3	Mean and Variance of Random Variable
8	3/11 (T)	4.1-4.2	Review for Midterm
8	3/14 (F)	4.3	Midterm Exam, Friday, March 14, 2025
10	3/25 (T)	5.1-5.2	Binomial Distribution
10	3/28 (F)	5.3	Hypergeometric Distribution
11	4/1 (T)	5.4	Negative Binomial Distribution
11	4/4 (F)	5.5-5.6	Poisson Distribution and Process

12	4/8 (T)	5.5-5.6	Poisson Distribution and Process – continued
12	4/11 (F)	6.1-6.3	Continuous Uniform and Normal
13	4/15 (T)	6.1-6.3	Continuous Uniform and Normal – continued
14	4/22 (T)	6.4-6.5	Normal Approximation to Binomial
14	4/25 (F)	6.6	Gamma and Exponential distributions
15	4/29 (T)	7.1-7.3	Transformations and moment generating functions
15	5/2 (F)	7.1-7.3	Transformations and moment generating functions -- continued
16	5/6 (T)		Review
16	5/7 (W)		Friday Class Meet (Review)