MATH 333: Probability and Statistics
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: Descriptive statistics and statistical inference. Topics include discrete and continuous distributions of random variables, statistical inference for the mean and variance of populations, and graphical analysis of data.

Number of Credits: 3

Prerequisites: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 333-002	Professor D. Schmidt
Math 333-004	Professor K. Carfora
Math 333-006	Professor J. MacLaurin
Math 333-008	Professor S. Subramanian
Math 333-010	Professor K. Carfora
Math 333-012	Professor C. Kim
Math 333-014	Professor P. Natarajan
Math 333-016	Professor K. Carfora
Math 333-102	Professor K. Carfora

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

Required Textbook:

Title	*Applied Statistics and Probability for Engineers*
Author	Montgomery and Runger
Edition	7th
Publisher	John Wiley & Sons
ISBN #	1) 978-1119758693 (Text with WileyPlus Registration Card) 2) 978-1119498421 (Standalone WileyPlus Registration Card)

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 Objective: The objective of this course is to acquaint students with probability, descriptive statistics and statistical inference and demonstrate real world applications using examples drawn from various fields.

Course Outcomes: Upon successful completion of this course, the student will be able to
1) Demonstrate understanding of various statistical terms and methods for summarizing, organizing, and presenting data
2) Compute measures of central tendency, position, and variability and interpret them.
3) Describe sample space and events and demonstrate their knowledge of various counting techniques, notions of probability, random variables and various discrete and continuous probability distributions
4) Demonstrate conceptual understanding of sampling distributions and the central limit theorem
5) Perform statistical analysis, such as estimation, hypothesis testing, regression, and draw conclusions.

Course Assessment: The assessment tools used will include online weekly homework assignments, quizzes, two common mid-term exams, and a comprehensive common 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:

Homework and Quizzes	15% (7.5% each)
2 Common Midterm Exams	25% each
Final Exam	35%

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

A	90 - 100	C	65 - 74
B+	85 - 89	D	55 - 64
B	80 - 84	F	0 - 54
C+	75 - 79		

Attendance Policy: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the Math Department's Attendance Policy. This policy will be strictly enforced.

Religious Observance: NJIT is committed to supporting students observing religious holidays. Students must notify their instructors in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence.

Homework/ Quiz/Exam Requirements: Online Weekly Homework will be assigned on WileyPlus. Additional Homework and/or Quizzes would also be given. Quizzes could be on paper or using an online proctored environment (Lock down browser with Respondus). http://www.respondus.com/lockdown/download.php?id=264548414

Calculator Policy: Only a basic (non-programmable and non-graphing) calculator is permitted during the exams. Calculators that can perform integration or differentiation operations are not allowed during exams.

AI usage policy: AI usage is not permitted in this course for solving problems in class/ homework assignments, quizzes, and exams. Any violations will be dealt with according to the NJIT's academic integrity policy.

Old exams are available at:

http://math.njit.edu/students/undergraduate/course_exams.php

Technical Support: Students may contact the IST Service Desk with any questions. Questions or problems can be submitted via web form by going to: https://servicedesk.njit.edu and clicking on the "Report your issue online" link.

You may also call the IST Service Desk with any questions at 973-596-2900.

For technical issues with WileyPlus Online Homework, students can contact WileyPlus technical support.

Exams: There will be two proctored common midterm exams during the semester and one proctored comprehensive final exam during the final exam week. Common Exams will be held on the following days:

Common Midterm Exam 1	February 19, 2025
Common Midterm Exam 2	April 9, 2025
Final Exam Period	May 10 - May 16, 2025

The time of the midterm exams is **4:15-5:40 pm** for daytime students and **6:00-7:25 pm** for evening students. The final exam will test your knowledge of all the course material taught in the entire course. 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 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.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times unless being used for in-class work.

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

Week	Class	Lecture	Section	Topic
Week 1 1/21 (T)	1	1	6.1	*Descriptive statistics*: Numerical Summaries of data: Sample Mean, Sample Variance, Sample Standard Deviation, Range
	2	2	6.2	*Descriptive statistics*: Stem and Leaf Diagram, Mean, Median, Quartiles, Interquartile Range
Week 2 1/28 (T)	3	3	6.3, 6.4	*Descriptive statistics*: Histograms, Boxplot
	4	4	2.1, 2.2, 2.3	*Probability*: Sample Spaces and Events; Interpretations and Axioms of Probability
Week 3 2/4 (T)	5	5	2.4, 2.5, 2.6, 2.7	*Probability*: Addition rules; Conditional Probability; Multiplication and Total Probability Rules; Independence
	6	6	2.8	*Probability*: Bayes' theorem

Week				
Week 4 2/11(T)	7	7	3.1, 3.2	*Discrete Random Variables and Probability Distributions:* Discrete Random Variables; Probability Distributions and Probability Mass Functions; Cumulative Distribution Functions
	8	8	3.3, 3.4	*Discrete Random Variables and Probability Distributions:* Mean and Variance of a Discrete Random Variable; Discrete Uniform Distribution
Week 5 2/18 (T)	9			REVIEW FOR EXAM #1
	COMMON MIDTERM EXAM 1: WEDNESDAY ~ FEBRUARY 19, 2025			
	10	9	3.5, 3.6	*Discrete Random Variables and Probability Distributions:* Binomial Distribution; Geometric Distribution only from Section 3.6
Week 6 2/25 (T)	11	10	3.8	*Discrete Random Variables and Probability Distributions:* Poisson Distribution
	12	11	4.1, 4.2	*Continuous Random Variables and Probability Distributions:* Continuous Random Variables; Probability distributions and Probability Density Functions; Cumulative Distribution Functions
Week 7 3/4 (T)	13	12	4.3, 4.4	*Continuous Random Variables and Probability Distributions:* Mean and Variance of a Continuous Random Variable; Continuous Uniform Distribution
	14	13	4.7	*Continuous Random Variables and Probability Distributions:* Exponential Distribution
Week 8 3/11 (T)	15	14	4.5	*Continuous Random Variables and Probability Distributions:* Normal distribution
	16	15	4.6	*Continuous Random Variables and Probability Distributions:* Normal Approximation to the Binomial and Poisson Distributions
3/16(S) to 3/23(S)	SPRING RECESS (NO CLASSES)			
Week 9 3/25 (T)	17	16	7.1- 7.2	*Point estimation of Parameters and Sampling Distributions:* Point Estimation; Sampling Distributions and the Central Limit Theorem
	18	17	8.1	*Statistical Intervals for a Single Sample:* Confidence interval on the Mean of a Normal distribution, Variance Known

Week 10 4/1 (T)	19	18	8.2	*Statistical Intervals for a Single Sample:* Confidence Interval on the Mean of a Normal Distribution, Variance Unknown
	20	19	8.3	*Statistical Intervals for a Single Sample:* Confidence intervals on the Variance and Standard deviation of a Normal Distribution;
April 3 : Thursday: Wellness day (WITHDRAWAL DEADLINE: MONDAY, APRIL 7, 2025			
Week 11 4/8 (T)	21			REVIEW FOR EXAM #2
	MIDTERM EXAM II: WEDNESDAY ~ APRIL 9, 2025			
	22	20	8.4	*Statistical Intervals for a Single Sample:* Large-Sample Confidence Interval for a Population Proportion
Week 12 4/15 (T)	23	21	9.1- 9.2	*Tests of Hypotheses for a Single Sample:* Hypothesis Testing; Tests on the Mean of a Normal Distribution, Variance Known
	24	22	9.1- 9.2	*Tests of Hypotheses for a Single* Sample: Tests on the Mean of a Normal Distribution, Variance Known
Week 13 4/22(T)	25	23	9.3.1	*Tests of Hypotheses for a Single Sample:* Tests on the Mean of a Normal Distribution, Variance Unknown
	26	24	9.5.1	*Tests of Hypotheses for a Single Sample:* Tests on a Population Proportion
Week 14 4/29 (T)	27	25	10.4 10.1.1, 10.1.3	*Statistical Inference for Two Samples:* Paired t-test Inference on the Difference in Means of Two Normal Distributions, Variances known
	28	26	11.2	*Simple Linear Regression and Correlation:* Simple Linear Regression (If time permits) REVIEW FOR FINAL EXAM
Week 15 5/6 (T)	**May 6 (Tuesday): Thursday classes meet** **May 7 (Wednesday): Friday classes meet**			
	Reading Day 5/8 and 5/9 (R & F)			