MATH 341: Statistical Methods I
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: Covers applications of classical statistical inference. Topics include transformation of variables, moment generating technique for distribution of variables, introduction to sampling distributions, point and interval estimation, maximum likelihood estimators and MVUES, basic statistical hypotheses and tests of parametric hypotheses about means of normal populations, chi-square tests of homogeneity, independence, goodness-of-fit. Effective From: Spring 2009.

Number of Credits: 3

Prerequisites: Math 244 with a grade of C or better or Math 333 with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 341-004	Professor J. Porus

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

Required Textbook:

Title	*Mathematical Statistics with Applications*
Author	Wackerly, Mendenhall, and Scheaffer
Edition	7th
Publisher	Thomson Brooks/Cole
ISBN #	978-0495110811

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: Students should

(a) develop greater depth of understanding of probability distributions, estimators and statistical interference using scientific and engineering applications,

(b) learn about more advanced statistical concepts with a greater theoretical understanding, especially regarding new concepts like order statistics, maximum likelihood and the central limit theorem,

(c) gain experience in the use of statistical approximation in studying mathematical and scientific problems and the importance of mathematically understanding and evaluating the accuracy of approximations,

(d) learn new statistical designs of experiments and the ways in which to extract the most information out of data

Course Outcomes: Students have improved logical thinking and problem-solving skills. Students have a greater understanding of the importance of probability distributions and statistical inference in science and technology. Students are prepared for further study in more advanced statistics courses as well as actuarial sciences, applied math and other areas.

Course Assessment: The assessment of objectives is achieved through homework, quizzes, and three examinations.

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/Quizzes	20%
Exam 1	25%
Exam 2	25%
Final Exam	30%

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

A	90 - 100	**C**	66 – 74
B+	85 - 89	**D**	56 – 65
B	80 - 84	**F**	0 – 55
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.

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 and Worksheet Policy: Homework problems assigned are listed at the end of each Chapter lecture. Assignments are on canvas and homework will be submitted via a **single PDF upload** to the appropriate canvas assignment.

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

Exams and Quizzes: Exams will be closed notes, closed books and given during class times, announced at least one month in advance. Tentative dates are provided in the syllabus for the two in-class exams. Quizzes will follow the same policy and generally be given once a week during the first 20 minutes of class.

Tentative Midterm Exam Date	Tuesday March 4, 2025
Final Exam Period	May 10 - May 16, 2025

We will follow the Math Department's Examination Policy for Exams and Quizzes. This policy will be strictly enforced.

Makeup Exam Policy: 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 Instructor that the exam will be missed. If possible, a makeup midterm exam will be given. If not possible, the student will take a cumulative final exam that will count as both the midterm and final exam grade.

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

AI Usage Policy: This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted throughout this course under any circumstance.

Important Departmental and University Policies:

- *Academic Integrity Code is Strictly Enforced*
- *Prerequisites Requirements are Enforced*
- *Attendance is Required in Lower-Division Courses*
- *Exam Policies (No Make Up Exams and More)*
- *Cell Phone and Pager Use Prohibited in Class*
- *Drop Date is Strictly Observed*
- *Complete DMS Course Policies*

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

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Lecture	Sections	Topic	Assignment
1	5.2	Bivariate and Multivariate Probability Distributions	1, 2, 5, 6, 7, 8, 11, 12, 15
2	5.3	Marginal and Conditional Probability Distributions	19, 20, 24, 25, 26, 29
3	5.5, 5.7	Expected Values and Covariance	74ab, 76a, 77, 79, 91, 93ab, 96a, 99
4	6.2, 6.3	Method of Distribution Functions	1, 3, 6
5	6.4	Method of Transformations	23, 24, 31
6	4.9, 6.5	Moments and Moment Generating Functions; Method of Moments (overview)	Ch 4: 140, 144, 145
7	6.7	Order Statistics	73, 75, 81
8	7.1	Intro to Sampling Distributions	Included with 7.2 HW
9		**EXAM 1: February 18th**	
10	7.2	Sampling Distributions related to the Normal Distribution	9, 11, 21, 29, 33, 37,
11	7.3	Central Limit Theorem	43, 45, 46, 47, 52, 57,
12	8.2, 8.3	Bias and Mean Square Error of Point Estimators	1, 2, 3, 5, 6, 8, 11, 15, 17
13	9.5	Minimum Variance Unbiased Estimators (MVUE)	Given in class
14	9.7	Maximum Likelihood	80, 83, 89
15	8.6, 8.7	Confidence Intervals	56, 57, 59, 60, 71, 73
16	8.8, 8.9	Confidence Intervals	81, 82, 84
17		**EXAM 2: March 25th**	
18	10.2, 10.3	Hypothesis Testing Basics	17, 18, 19, 34
19	10.4	Type II error	37, 41
20	10.6	p-values	54, 55, 57
21	10.8	Small Sample Hypothesis Testing	24, 27, 28, 30, 39, 63a, 65a, 66a71a, 73, 75
22	10.10	Power of Tests; Neyman-Pearson Lemma	89, 90, 91, 96, 101
23	13.2	ANOVA	1ac
24	13.3, 13.4	ANOVA Models	7a, 9a, 11, 15
25	14.1, 14.2	Categorical Data; Chi-Squared Test	None
26	14.3	Goodness of Fit Test	1, 3, 5, 11
27	14.4	Contingency Tables	13a, 19, 21
28		REVIEW	