MATH 341: Statistical Methods I
Fall 2024 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, 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 341-001	Professor K. Carfora

Office Hours for All Math Instructors: Fall 2024 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, November 11, 2024**. It will be strictly enforced.

COURSE GOALS

Course Objectives

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, basic statistical hypotheses and tests, classical tests of parametric hypotheses about means of normal populations, chi-square tests of homogeneity, independence, goodness- of-fit.

Course Outcomes

- Learn estimation techniques such as maximum likelihood.
- Develop the skills to compute uniformly minimum variance unbiased estimators.
- Learn the likelihood ratio test.
- Learn to compute confidence intervals.
- Learn to perform hypothesis tests.
- Learn to compute the power of tests

Course Assessment: Will be based on regular homework, two midterm exams, and one 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:

Attendance	5%
Homework	10%
Quizzes	25%
Midterm Exam II	30%
Final Exam	30%

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

A	**90 - 100**	**C**	**66-74**
B+	**85-89**	**D**	**60-65**
B	**80-84**	**F**	**0-59**
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.

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: There is **one midterm exam** held in class during the semester and one final exam. Exams will likely be held on the following days but are subject to change

Midterm Exam	Tuesday October 15, 2024
Final Exam Period	December 15 - December 21, 2024

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 a quiz or 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 quiz/exam will be missed. In the case of a missed quiz with documentation, the quiz will be excused. In the case of a missed exam with documentation, the final exam score will take the place of the missed exam.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Fall 2024 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 need an accommodation due to a disability, please contact the Office of Accessibility Resources and Services at oars@njit.edu, or visit Kupfrian Hall 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the office authorizing student accommodations is 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: Fall 2024 Academic Calendar, Registrar)

Date	Day	Event
September 2, 2024	Monday	Labor Day
September 3, 2024	Tuesday	First Day of Classes
September 9, 2024	Monday	Last Day to Add/Drop Classes
November 11, 2024	Monday	Last Day to Withdraw
November 26, 2024	Tuesday	Thursday Classes Meet
November 27, 2024	Wednesday	Friday Classes Meet
November 28 to December 1, 2024	Thursday and Sunday	Thanksgiving Recess - Closed
December 11, 2024	Wednesday	Last Day of Classes
December 12, 2024	Thursday	Reading Day 1
December 13, 2024	Friday	Reading Day 2
December 15 to December 21, 2024	Sunday to Saturday	Final Exam Period

Course Outline (Tentative)

Lecture # / Date	Chapter/ Sections	Topic
1, T 9/3	Intro Review	Quick introduction to the course What you're expected to know from MATH 244/333
2, F 9/6	3.9 4.9	Moment Generating Functions of Discrete Variables Moment Generating Functions of Continuous Variables
3, T 9/10	4.9 5.2	Moment Generating Functions of Continuous Variables Bivariate Probability Distributions
4, F 9/13	5.2	Bivariate Probability Distributions
5, T 9/17	5.3	Marginal and Conditional Probability Distributions
6, F 9/20	5.3 5.4 5.5	Marginal and Conditional Probability Distributions Independent Random Variables Expected Value of a Function of Random Variables

7, T 9/24	5.6 5.7 5.8	Special Theorems for Expected Value Covariance of Two Random Variables Expected Value, Variance of Linear Functions of Variables
8, F 9/27	6.3	Method of Distribution Functions
9, T 10/1	6.4 6.5	Method of Transformations Method of Moment-Generating Functions
10, F 10/4	6.7	Order Statistics
11, T 10/8	7.2	Sampling Distributions: Normal Distributions
12, F 10/11	7.2 Review	Sampling Distributions: Chi-Square Distributions Short Review of Topics on Midterm Exam
13, T 10/15		**Midterm Exam (Chapters 3-6)**
14, F 10/18	7.2 7.3	Sampling Distributions: t-Distributions The Central Limit Theorem
15, T 10/22	8.2 8.6	Bias and Mean Square Error of Point Estimates Intro to Confidence Intervals
16, F 10/25	8.6 8.7	Large-Sample Confidence Intervals Selecting the Sample Size for Confidence Intervals
17, T 10/29	8.8 8.9	Small-Sample Confidence Intervals for Population Means Confidence Intervals for Population Variance
18, F 11/1	9.7	Method of Maximum Likelihood and MLEs
19, T 11/5	9.5	Minimum-Variance Unbiased Estimation (MVUE)
20, F 11/8	10.2 10.3	Elements of a Statistical (Hypothesis) Test Common Large-Sample (Hypothesis) Tests
21, T 11/12	10.3 10.6	Common Large-Sample (Hypothesis) Tests Attained Significance Levels (P-Values)
22, F 11/15	10.4	Calculating Type II Error and Finding Sample Size

23, T 11/19	10.8	Small-Sample Hypothesis Testing
24, F 11/22	10.10	Power of Tests and the Neyman-Pearson Lemma
T 11/26 **R Schedule**		**No class T 11/26 - follows a Thursday schedule**
25, W 11/27 **F schedule**	14.1-14.2 14.3	Analysis of Categorical Data; The Chi-Square Statistic Goodness of Fit Test
F 11/29 **No Class**		**No class F 11/29 - Thanksgiving Break**
26, T 12/3	14.4	Contingency Tables and the Test of Independence
27, F 12/6	Catch-up Review	Finish any leftover material Short Review of Topics on Final Exam
28, T 12/10	Day of fun!	Group Work (Quiz Grade) - Challenge Problems
Date TBD 12/15-12/21	**Final Exam (Chapters 7-10, 14)**	