

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 341: Statistical Methods I

Spring 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 341-002	Professor K. Carfora

Office Hours for All Math Instructors: **Spring 2024 Office Hours and Emails**

Required Textbook:

Title	<i>Mathematical Statistics with Applications</i>
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 1, 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

- Develop skills in the methods of mathematical statistics.
- Recall and apply different estimation techniques (method of moments, maximum likelihood).
- Develop the skills to compute uniformly minimum variance unbiased estimators.
- Recall and apply the likelihood ratio test.
- Recall and apply confidence intervals.
- Recall and apply hypothesis tests including Chi-squared tests of homogeneity of populations, independence of categorical variables and goodness-of-fit.
- Recall and compute the power of tests

Course Assessment: Will be based on regular homework, quizzes, a midterm exam, and a 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	15%
Quizzes	25%
Midterm Exam	30%
Final Exam	30%

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**.

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.**

Midterm Exam	Thur Feb 27th (Tentative)
Final Exam Period	May 3 - May 9, 2024

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. 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 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 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 2024 Academic Calendar, Registrar**)

Date	Day	Event
January 16, 2024	Tuesday	First Day of Classes
January 22, 2024	Monday	Last Day to Add/Drop Classes
March 10, 2024	Sunday	Spring Recess Begins
March 16, 2024	Saturday	Spring Recess Ends
March 29, 2024	Friday	Good Friday - No Classes
April 1, 2024	Monday	Last Day to Withdraw
April 30, 2024	Tuesday	Friday Classes Meet
April 30, 2024	Tuesday	Last Day of Classes
May 1, 2024	Wednesday	Reading Day 1
May 2, 2024	Thursday	Reading Day 2
May 3 - May 9, 2024	Friday to Thursday	Final Exam Period

Course Outline (very tentative 😊)

Lecture	Chapter/ Sections	Topic
1	Introduction Review	Quick introduction to the course What you're expected to know from MATH 244/333
2	3.9 4.9	Moment Generating Functions (MGFs) of Discrete Variables Moment Generating Functions (MGFs) of Continuous Variables
3	5.2	Bivariate Probability Distributions
4	5.2	Bivariate Probability Distributions
5	5.3	Marginal and Conditional Probability Distributions
6	5.4 5.5-5.6	Independent Random Variables Expected Value of a Function of Random Variables
7	5.7 5.8	Covariance of Two Random Variables Expected Value and Variance of Linear Functions of Variables
8	6.3	Method of Distribution Functions

9	6.4 6.5	Method of Transformations Method of Moment-Generating Functions
10	6.7	Order Statistics
11	7.2	Sampling Distributions Related to the Normal Distribution
12	7.2 Review	Sampling Distributions Related to the Normal Distribution Review for Midterm Exam
13 (T 2/27)		Midterm Exam (Chapters 3-6)
14	7.2	Sampling Distributions Related to the Normal Distribution
15	7.3 8.2	The Central Limit Theorem The Bias and Mean Square Error of Point Estimates
16	8.3 8.6	Some Common Unbiased Point Estimates Large-Sample Confidence Intervals
Spring Recess ~ No Classes ~ University Open		
17	8.7 8.8	Selecting the Sample Size Small-Sample Confidence Intervals for Population Means
18	8.9	Confidence Intervals for Population Variance
19	9.2-9.4	Relative Efficiency, Consistency, and Sufficiency
20	9.5	Minimum-Variance Unbiased Estimation
21	9.7	Method of Maximum Likelihood
22	Chapter 10	Hypothesis Testing
23	Chapter 10	Hypothesis Testing
24	Chapter 10	Hypothesis Testing
25	Chapter 10	Hypothesis Testing
26	Chapter 13	ANOVA
27	Chapter 13	ANOVA

28	Catch-up Review	Review for Final Exam
5-3 to 5-10	Final Exam (Chapters 7-10, 13)	

Additional Topics, time permitting: Chapter 14: Analysis of Categorical Data

*Updated by Professor K. Carfora- 12/19/2023
Department of Mathematical Sciences Course Syllabus, Spring 2024*