MATH 341: Statistical Methods I
Fall 2023 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 S. Subramanian

Office Hours for All Math Instructors: Fall 2023 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 13, 2023**. 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:

Homework/Quizzes	20%
Midterm Exam I	25%
Midterm Exam II	25%
Final Exam	30%

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 and absence will affect the grade due to class participation requirement (10% of the grade).

Homework and Quiz Policy: Regular homework will be assigned. They need to be submitted on the due date in class. Late homework and emailed homework will not be accepted. If you miss class on the day of homework submission, you may hand it over to me perhaps on the previous lecture day that you attended.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. Exams will likely be held on the following days:

Midterm Exam I	October 12, 2023
Midterm Exam II	November 9, 2023

Final Exam Period	December 17 - December 23, 2023

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 beepers must be switched off during all class times.

Laptops: To the extent that they are needed to view the textbook online, they may be used; otherwise should be kept closed.

Grading: Grading complaints should be resolved immediately with the instructor.

Calculators: Calculators are allowed but should be basic, without graphing capabilities, algebraic

simplification capabilities, formula-storing capabilities and without other such capabilities.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Fall 2023 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 2023 Academic Calendar, Registrar)

Date	Day	Event
September 4, 2023	Monday	Labor Day
September 5, 2023	Tuesday	First Day of Classes
September 11, 2023	Monday	Last Day to Add/Drop Classes

November 13, 2023	Monday	Last Day to Withdraw
November 21, 2023	Tuesday	Thursday Classes Meet
November 22, 2023	Wednesday	Friday Classes Meet
November 23 to November 26, 2023	Thursday and Saturday	Thanksgiving Recess - Closed
December 13, 2023	Wednesday	Last Day of Classes
December 14, 2023	Thursday	Reading Day 1
December 15, 2023	Friday	Reading Day 2
December 17 to December 23, 2023	Sunday to Saturday	Final Exam Period

Course Outline

Week	Lecture	Section	Topic
Week 1 9/5 (T)	1	7.1-7.3	Random Samples, Sampling Distributions related to the Normal Distribution
	2	7.1-7.3	Sampling Distributions related to the Normal Distribution
Week 2 9/12 (T)	3	7.5	Normal approximation to the binomial distribution
	4	8.1-8.3	Point estimators and their Bias and Mean Square Error
Week 3 9/19 (T)	5	8.3-8.4	Evaluating the goodness of a point estimator
	6	8.5-8.6	Large sample confidence intervals
Week 4 9/26(T)	7	8.7-8.8	Small sample confidence intervals
	8	8.9	Confidence intervals for the population variance
Week 5 10/3 (T)	9	6.3-6.5	Transformations
	10	6.7	Order Statistics
Week 6 10/10 (T)	11		REVIEW FOR EXAM #1
			MIDTERM EXAM I: THURSDAY ~ October 12, 2023
Week 7 10/17 (T)	12	9.2-9.3	Relative Efficiency, Consistency
	13	9.4	Sufficiency
Week 8 10/24 (T)	14	9.5-9.6	Minimum variance unbiased estimation (MVUE)
	15	9.6	MVUEs
Week 9 10/31 (T)	16	9.7	Maximum likelihood estimation (MLE)
	17	9.7	MLEs

Week 10 11/7 (T)			**MIDTERM EXAM II: THURSday ~ November 9, 2023**
	18		
			(WITHDRAWAL DEADLINE: Monday, November 13, 2023
Week 11 11/14 (T)	**19**	**10.2**	Elements of a statistical test
	20	**10.3**	Common large sample tests
Week 12 11/21 (T)	**21**	**10.4**	Type II error and sample size determination
	22	**10.5**	Hypothesis testing vs Confidence intervals
11/23 to 11/26			Thanksgiving Recess
Week 13 11/28 (T)	**23**	**10.6**	Attained significance levels
	24	**10.8**	Small-sample hypothesis testing
Week 14 12/5 (T)	**25**	**10.10 - 10.11**	Neyman-Pearson lemma
	26		Likelihood ratio tests
Week 15 12/12 (T)			December 12 (Tuesday): Final lecture
			Reading Day 12/14 and 12/15 (R & F)
12/17-12/23			**Final EXAM WEEK**

Updated by Professor S. Subramanian - 8/11/2023
Department of Mathematical Sciences Course Syllabus, Fall 2023