NJIT
New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 341: Statistical Methods I
Spring 2021 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 J. Porus

Office Hours for All Math Instructors: Spring 2021 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 5, 2021**. It will be strictly enforced.

COURSE GOALS

Learning Outcomes

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

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 and Quizzes	20%
Midterm Exam I	25%
Midterm Exam II	25%
Final Exam	30%

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

A	88 - 100	C	63 - 72
B+	83 - 87	D	56 - 62
B	78 - 82	F	0 - 55
C+	73 - 77		

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.

New Policy for Exams and Quizzes: Exams will be proctored using both Respondus LockDown Browser+Monitor and Webex. Students will be required to join a Webex meeting from their phone with their cameras on, and to access the exam through LockDown Browser on a Mac or Windows PC with webcam. Students must follow all instructions related to environment checks and camera positioning. At the beginning of the semester, the DMS Exam Coordinator will provide students with a demonstration video and instructions of expected behavior and procedures, including what is expected in an environment check.

Quizzes: Quizzes will be given approximately once a week throughout the semester. They will be based on the

lecture, homework and the in-class discussions. Quizzes will be administered in Canvas using the same method of proctoring as described in the DMS Policy for Exams and Quizzes. Students will have approximately 20 minutes to write solutions to their quiz, and then must upload their written work within 5 minutes of completing the quiz. If a student experiences difficulty uploading their work to Canvas, they MUST email their work to their instructor immediately.

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

Midterm Exam I	February 16, 2021
Midterm Exam II	March 25, 2021
Final Exam Period	May 7 - 13, 2021

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.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Spring 2021 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.

All students must familiarize themselves with and adhere to the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. The Department of Mathematical Sciences takes these policies very seriously and enforces them strictly.

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 contact Chantonette Lyles, Associate Director of the Office of Accessibility Resources and Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibilty Resources and Services 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/studentsuccess/accessibility/

Important Dates (See: Spring 2021 Academic Calendar, Registrar)

Date	Day	Event
January 19, 2021	T	First Day of Classes

January 23, 2021	S	Saturday Classes Begin	
January 25, 2021	M	Last Day to Add/Drop Classes	
March 14 - March 21, 2021	Su - Su	Spring Recess - No Classes	
April, 2, 2021	F	Good Friday - No Classes	
April 5, 2021	M	Last Day to Witdraw	
May 4, 2021	T	Friday Classes Meet	
May 4, 2021	T	Last Day of Classes	
May 5 & May 6, 2021	W & R	Reading Days	
May 7 - May 13, 2021	F - R	Final Exam Period	

Course Outline

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 16th**	
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	10.1	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**	