NJIT
New Jersey Institute
of Technology

THE COLLEGE OF SCIENCE
AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 333: Probability and Statistics
Spring 2022 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.

DMS Online Exam Policy Spring 2022: In the event it is determined that DMS will conduct Common Exams online during Spring 2022, those exams will be administered in Canvas with proctoring using both Respondus LockDown Browser+Monitor on a computer (PC or Mac only; iPad and Chromebooks are not currently supported) and Webex on a phone or secondary device.

Please be sure you read and fully understand our DMS Online Exam Policy.

COURSE INFORMATION

Course Description: Descriptive statistics and statistical inference. Topics include discrete and continuous distributions of random variables, statistical inference for the mean and variance of populations, and graphical analysis of data.

Number of Credits: 3

Prerequisites: MATH 112 with a grade of C or better or MATH 133 with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 333-002	Professor K. Carfora
Math 333-004	Professor C. Kim
Math 333-006	Professor D. Schmidt
Math 333-008	Professor K. Horwitz
Math 333-010	Professor C. Kim
Math 333-012	Professor W.Guo
Math 333-014	Professor P. Natarajan
Math 333-016	Professor C. Kim

Math 333-102	Professor J. Porus

Office Hours for All Math Instructors: Spring 2022 Office Hours and Emails

Required Textbook:

Title	*Applied Statistics and Probability for Engineers*
Author	Montgomery and Runger
Edition	7th
Publisher	John Wiley & Sons
ISBN #	1) 978-1119758693 (Text with WileyPlus Registration Card) 2) 978-1119498421 (Standalone WileyPlus Registration Card)

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday, April 4, 2022. It will be strictly enforced.

COURSE GOALS

Course Objective: The objective of this course is to acquaint students with probability, descriptive statistics and statistical inference and demonstrate real world applications using examples drawn from various fields.

Course Outcomes: Upon successful completion of this course, the student will be able to
1) Demonstrate understanding of various statistical terms and methods for summarizing, organizing, and presenting data
2) Compute measures of central tendency, position, and variability and interpret them.
3) Describe sample space and events and demonstrate their knowledge of various counting techniques, notions of probability, random variables and various discrete and continuous probability distributions
4) Demonstrate conceptual understanding of sampling distributions and the central limit theorem
5) Perform statistical analysis, such as estimation, hypothesis testing, regression, and draw conclusions.

Course Assessment: The assessment tools used will include online weekly homework assignments, quizzes, two common mid-term exams, and a comprehensive common 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 and Quizzes	15% (7.5% each)
2 Common Midterm Exams	25% each

Final Exam	35%

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. This policy will be strictly enforced.

Homework/ Quiz Requirements: Online Weekly Homework will be assigned on WileyPlus. Additional Homework and/or Quizzes would also be given. Quizzes could be on paper or using an online proctored environment (Lock down browser with Respondus).

http://www.respondus.com/lockdown/download.php?id=264548414

Old exams are available at:

http://math.njit.edu/students/undergraduate/course_exams.php

Technical Support: Students may contact the IST Service Desk with any questions at 973-596-2900. Questions or problems can be submitted via web form by going to: https://servicedesk.njit.edu and clicking on the "Report your issue online" link.

For technical issues with WileyPlus Online Homework, students can contact WileyPlus technical support.

Exams: There will be two proctored common midterm exams during the semester and one proctored comprehensive final exam during the final exam week. Common Exams will be held on the following days:

Exam I	February 23, 2022
Exam II	April 13, 2022
Final Exam Period	May 6 - May 12, 2022

The time of the midterm exams is **4:15-5:40 pm** for daytime students and **5:45-7:10 pm** for evening students. The final exam will test your knowledge of all the course material taught in the entire course. 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.

Calculator Policy: Only a basic (non-programmable and non-graphing) calculator is permitted during the

exams.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times unless being used for in-class work.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Spring 2022 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 contact Scott Janz, Associate Director of Disability Support Services at 973-596-5417 or via email at scott.p.janz@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/studentsuccess/accessibility/

Important Dates (See: Spring 2022 Academic Calendar, Registrar)

Date	Day	Event
January 18, 2022	Tuesday	First Day of Classes
January 22, 2022	Saturday	Saturday Classes Begin
January 24, 2022	Monday	Last Day to Add/Drop Classes
March 14, 2022	Monday	Spring Recess Begins
March 19, 2022	Saturday	Spring Recess Ends
April 4, 2022	Monday	Last Day to Withdraw
April 15, 2022	Friday	Good Friday - No Classes
April 17, 2022	Sunday	Easter Sunday - No Classes
May 3, 2022	Tuesday	Friday Classes Meet
May 3, 2022	Tuesday	Last Day of Classes
May 4 - May 5, 2022	Wednesday and Thursday	Reading Days
May 6 - May 12, 2022	Friday to Thursday	Final Exam Period

Course Outline
Online Homework Assignments will be posted on WileyPlus.

Week	Class	Lecture	Section	Topic
Week 1 1/18 (T)	1	1	6.1	*Descriptive statistics:* Numerical Summaries of data: Sample Mean, Sample Variance, Sample Standard Deviation, Range
	2	2	6.2	*Descriptive statistics:* Stem and Leaf Diagram, Mean, Median, Quartiles, Interquartile Range
Week 2 1/25 (T)	3	3	6.3, 6.4	*Descriptive statistics:* Histograms, Boxplot
	4	4	2.1, 2.2, 2.3	*Probability:* Sample Spaces and Events; Interpretations and Axioms of Probability
Week 3 2/1 (T)	5	5	2.4, 2.5, 2.6, 2.7	*Probability:* Addition rules; Conditional Probability; Multiplication and Total Probability Rules; Independence
	6	6	2.8	*Probability:* Bayes' theorem
Week 4 2/8(T)	7	7	3.1, 3.2	*Discrete Random Variables and Probability Distributions:* Discrete Random Variables; Probability Distributions and Probability Mass Functions; Cumulative Distribution Functions
	8	8	3.3, 3.4	*Discrete Random Variables and Probability Distributions:* Mean and Variance of a Discrete Random Variable; Discrete Uniform Distribution
Week 5 2/15 (T)	9	9	3.5, 3.6	*Discrete Random Variables and Probability Distributions:* Binomial Distribution; Geometric Distribution only from Section 3.6
	10	10	3.8	*Discrete Random Variables and Probability Distributions:* Poisson Distribution
Week 6 2/22 (T)	11			REVIEW FOR EXAM #1
				MIDTERM EXAM I: WEDNESDAY ~ FEBRUARY 23, 2022
	12	11	4.1, 4.2	*Continuous Random Variables and Probability Distributions:* Continuous Random Variables; Probability distributions and Probability Density Functions; Cumulative Distribution Functions
Week 7 3/1 (T)	13	12	4.3, 4.4	*Continuous Random Variables and Probability Distributions:* Mean and Variance of a Continuous Random Variable; Continuous Uniform Distribution
	14	13	4.7	*Continuous Random Variables and Probability Distributions:* Exponential Distribution
Week 8 3/8 (T)	15	14	4.5	*Continuous Random Variables and Probability Distributions:* Normal distribution
	16	15	4.6	*Continuous Random Variables and Probability Distributions:* Normal Approximation to the Binomial and Poisson Distributions
3/13(S) to 3/20(S)				**SPRING RECESS (NO CLASSES)**

Week				
Week 9 3/22 (T)	17	16	7.1- 7.2	*Point estimation of Parameters and Sampling Distributions:* Point Estimation; Sampling Distributions and the Central Limit Theorem
	18	17	8.1	*Statistical Intervals for a Single Sample:* Confidence interval on the Mean of a Normal distribution, Variance Known
Week 10 3/29 (T)	19	18	8.2	*Statistical Intervals for a Single Sample:* Confidence Interval on the Mean of a Normal Distribution, Variance Unknown
	20	19	8.3	*Statistical Intervals for a Single Sample:* Confidence intervals on the Variance and Standard deviation of a Normal Distribution
				(WITHDRAWAL DEADLINE: MONDAY, APRIL 4, 2022
Week 11 4/5 (T)	21	20	8.4	*Statistical Intervals for a Single Sample:* Large-Sample Confidence Interval for a Population Proportion
	22	21	9.1- 9.2	*Tests of Hypotheses for a Single Sample:* Hypothesis Testing; Tests on the Mean of a Normal Distribution, Variance Known
Week 12 4/12 (T)	23			REVIEW FOR EXAM #2
				MIDTERM EXAM II: WEDNESDAY ~ APRIL 13, 2022
	24	22	9.1- 9.2	*Tests of Hypotheses for a Single Sample:* Tests on the Mean of a Normal Distribution, Variance Known
Week 13 4/19(T)	25	23	9.3.1	*Tests of Hypotheses for a Single Sample:* Tests on the Mean of a Normal Distribution, Variance Unknown
	26	24	9.5.1	*Tests of Hypotheses for a Single Sample:* Tests on a Population Proportion
Week 14 4/26 (T)	27	25	10.4 10.1.1, 10.1.3	*Statistical Inference for Two Samples:* Paired t-test Inference on the Difference in Means of Two Normal Distributions, Variances known
	28	26	11.2	*Simple Linear Regression and Correlation:* Simple Linear Regression (if time permits) REVIEW FOR FINAL EXAM
Week 15 5/3 (T)				May 3 (Tuesday): Friday classes meet
				Reading Day 5/4 and 5/5 (W & R)
5/6 - 5/12				**FINAL EXAM WEEK**