MATH 333 Honors: Probability and Statistics
Fall 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.

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 112H with a grade of B or better or MATH 112 with a grade of A.

Course-Section and Instructors:

Course-Section	Instructor
Math 333-H01	Professor Padma Natarajan

Office Hours for All Math Instructors: Fall 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 **M** is **Monday, November 14, 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 and quizzes/additional homework/mini-projects, 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, Quizzes, Mini Projects	15%
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/Exam Requirements: Online Weekly Homework will be assigned on WileyPlus. Additional Homework/Mini-Projects and/or Quizzes would also be given.

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. 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.

You may also call the IST Service Desk with any questions at 973-596-2900.

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. Exams will be held on the following days:

Exam I	October 12, 2022
Exam II	November 30, 2022
Final Exam Period	December 16 - 22, 2022

The time of the midterm exams is **4:15-5:40 pm** for daytime students and **6:00-7:25 pm** for evening students. The final exam will test your knowledge of all the course material taught in the entire courseThe 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 unless being used for in-class work.

ADDITIONAL RESOURCES

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

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

Date	Day	Event
September 5, 2022	Monday	Labor Day
September 6, 2022	Tuesday	First Day of Classes
September 12, 2022	Monday	Last Day to Add/Drop Classes
November 14, 2022	Monday	Last Day to Withdraw
November 22, 2022	Tuesday	Thursday Classes Meet
November 23, 2022	Wednesday	Friday Classes Meet
November 24 to November 25, 2022	Thursday and Friday	Thanksgiving Recess - Closed
November 26, 2022	Saturday	Saturday Classes Meet
December 14, 2022	Wednesday	Last Day of Classes
December 15, 2022	Thursday	Reading Day
December 16 to December 22, 2022	Friday to Thursday	Final Exam Period

Course Outline
Online Homework Assignments will be posted on WileyPlus.

Week	Class	Lecture	Section	Topic
Week 1 9/6 (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 9/13 (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 9/20 (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 9/27 (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 10/4(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 10/11 (T)	*11*			*REVIEW FOR EXAM #1*
	COMMON MIDTERM EXAM 1: OCTOBER 12, 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 10/18 (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 10/25 (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*
Week 9 11/1(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 11/8(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: 11/14(M)			
Week 11 11/15(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 *11/22(T)*	**23**	**22**	**9.1- 9.2**	Tests of Hypotheses for a Single Sample: Tests on the Mean of a Normal Distribution, Variance Known
				THANKSGIVING RECESS: 11/24(R) to 11/27(S)
Week 13 *11/29(T)*	**24**			*REVIEW FOR EXAM #2*
				COMMON MIDTERM EXAM 2: NOVEMBER 30, 2022
	25	**23**	**9.3.1**	Tests of Hypotheses for a Single Sample: Tests on the Mean of a Normal Distribution, Variance Unknown
Week 14 *12/6 (T)*	**26**	**24**	**9.5.1**	Tests of Hypotheses for a Single Sample: Tests on a Population Proportion
	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
Week 15 *12/13(T)*	**28**	**26**	**11.2**	Simple Linear Regression and Correlation: Simple Linear Regression (If time permits) *REVIEW FOR FINAL EXAM*
	LAST DAY OF CLASSES 12/14 (W)			
				Reading Day 12/15 (R)
				FINAL EXAM WEEK: 12/16(F) to 12/22(R)