MATH 333: Probability and Statistics
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: 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 333-001	Professor Ken Horwitz
Math 333-003	Professor Padma Natarajan
Math 333-005	Professor Wenge Guo
Math 333-007	Professor Chulmin Kim
Math 333-009	Professor Ken Horwitz
Math 333-011	Professor Kristin Carfora
Math 333-013	Professor Donivyn Schmidt
Math 333-015	Professor Ji Meng Loh
Math 333-017	Professor Sunil Dhar
Math 333-019	Professor Chulmin Kim
Math 333-021	Professor Jonathan Porus
Math 333-101	Professor Jonathan Porus

Office Hours for All Math Instructors: Fall 2023 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, November 13, 2023. 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/Exam 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

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

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. Common Exams will be held on the following days:

Midterm Exam I	October 4, 2023
Midterm Exam II	November 15, 2023
Final Exam Period	December 17 - December 23, 2023

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 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.

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 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
Online Homework Assignments will be posted on WileyPlus.

Week	Class	Lecture	Section	Topic
Week 1 9/6 (W)	1	1	6.1	*Descriptive statistics:* Numerical Summaries of data: Sample Mean, Sample Variance, Sample Standard Deviation, Range
Week 2 9/13 (W)	2	2	6.2	*Descriptive statistics:* Stem and Leaf Diagram, Mean, Median, Quartiles, Interquartile Range
	3	3	6.3, 6.4	*Descriptive statistics:* Histograms, Boxplot
Week 3 9/20 (W)	4	4	2.1, 2.2, 2.3	*Probability:* Sample Spaces and Events; Interpretations and Axioms of Probability
	5	5	2.4, 2.5, 2.6, 2.7	*Probability:* Addition rules; Conditional Probability; Multiplication and Total Probability Rules; Independence
Week 4 9/27 (W)	6	6	2.8	*Probability:* Bayes' theorem
	7	7	3.1, 3.2	*Discrete Random Variables and Probability Distributions:* Discrete Random Variables; Probability Distributions and Probability Mass Functions; Cumulative Distribution Functions
Week 5 10/4 (W)	8			REVIEW FOR EXAM #1
				COMMON MIDTERM EXAM 1: OCTOBER 04, 2023
	9	8	3.3, 3.4	*Discrete Random Variables and Probability Distributions:* Mean and Variance of a Discrete Random Variable; Discrete Uniform Distribution
Week 6 10/11 (W)	10	9	3.5, 3.6	*Discrete Random Variables and Probability Distributions:* Binomial Distribution;

			Geometric Distribution only from Section 3.6
	11	10	3.8	*Discrete Random Variables and Probability Distributions:* Poisson Distribution
Week 7 10/18 (W)	12	11	4.1, 4.2	*Continuous Random Variables and Probability Distributions:* Continuous Random Variables; Probability distributions and Probability Density Functions; Cumulative Distribution Functions
	13	12	4.3, 4.4	*Continuous Random Variables and Probability Distributions:* Mean and Variance of a Continuous Random Variable; Continuous Uniform Distribution
Week 8 10/25 (W)	14	13	4.7	*Continuous Random Variables and Probability Distributions:* Exponential Distribution
	15	14	4.5	*Continuous Random Variables and Probability Distributions:* Normal distribution
Week 9 11/1(W)	16	15	4.6	*Continuous Random Variables and Probability Distributions:* Normal Approximation to the Binomial and Poisson Distributions
	17	16	7.1- 7.2	*Point estimation of Parameters and Sampling Distributions:* Point Estimation; Sampling Distributions and the Central Limit Theorem
Week 10 11/8(W)	18	17	8.1	*Statistical Intervals for a Single Sample:* Confidence interval on the Mean of a Normal distribution, Variance Known
	19	18	8.2	*Statistical Intervals for a Single Sample:* Confidence Interval on the Mean of a Normal Distribution, Variance Unknown
	WITHDRAWAL DEADLINE: Monday, November 13, 2023			
Week 11	20			REVIEW FOR EXAM #2

11/15(W)				COMMON MIDTERM EXAM 2: NOVEMBER 15, 2023
	21	19	8.3	*Statistical Intervals for a Single Sample:* Confidence intervals on the Variance and Standard deviation of a Normal Distribution;
Week 12 11/22 (Friday class)	22	20	8.4	*Statistical Intervals for a Single Sample:* **Large-Sample Confidence Interval for a Population Proportion**
			THANKSGIVING RECESS: November 23(R) to November 26, 2023 (S)	
Week 13 11/29(W)	23	21	9.1- 9.2	*Tests of Hypotheses for a Single* Sample*:* **Tests on the Mean of a Normal Distribution, Variance Known**
	24	22	9.3.1	*Tests of Hypotheses for a Single Sample:* Tests on the Mean of a Normal Distribution, Variance Unknown
Week 14 12/6 (W)	25	23	9.5.1	*Tests of Hypotheses for a Single Sample:* Tests on a Population Proportion
	26	24	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(W)	27	25	11.2	*Simple Linear Regression and Correlation:* Simple Linear Regression (If time permits)
	28	26		REVIEW FOR FINAL EXAM
	LAST DAY OF CLASSES November 13, 2023 (W)			
				Reading Day

				12/14 (R) and 12/15 (F)
	FINAL EXAM WEEK: December 17 (S) to December 23, 2023 (S)			

Updated by Professor P. Natarajan - 8/23/2023
Department of Mathematical Sciences Course Syllabus, Fall 2023