

MATH 333: Probability and Statistics

Spring 2019 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 333-004	Professor P. Natarajan
Math 333-006	Professor S. Mahmood
Math 333-008	Professor M. Michal
Math 333-010	Professor D. Schmidt
Math 333-014	Professor P. Natarajan
Math 333-018	Professor S. Mahmood
Math 333-028	Professor K. Carfora
Math 333-102	Professor K. Carfora

Office Hours for All Math Instructors: [Spring 2019 Office Hours and Emails](#)

Required Textbook:

Title	<i>Applied Statistics and Probability for Engineers</i>
Author	Montgomery and Runger
Edition	6th
Publisher	John Wiley & Sons

ISBN #	978-1118963548 (Custom Ed. Bundled w/ WP) 978-1118470688 (Standalone WP Registration Card)
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University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 8, 2019**. 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

- Demonstrate understanding of various statistical terms and methods for summarizing, organizing, and presenting data.
- Compute measures of central tendency, position, and variability and interpret them.
- 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.
- Demonstrate conceptual understanding of sampling distributions and the central limit theorem.
- Perform statistical analysis, such as estimation, hypothesis testing, regression, and draw conclusions.

Course Assessment: The assessment tools used will include quizzes and weekly homework assignments, two common mid-term exams, and a 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%
Common Midterm Exam I	25%
Common Midterm Exam II	25%
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 Policy: Online Weekly Homework will be assigned on WileyPlus. Additional Homework and/or Quizzes would be given in class.

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

Exams: There will be two common midterm exams held during the semester and one comprehensive common

final exam. Exams are held on the following days:

Common Midterm Exam I	February 27, 2019
Common Midterm Exam II	April 17, 2019
Final Exam Period	May 10 - 16, 2019

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. Make sure you read and fully understand the **Math Department's Examination Policy**. This policy will be strictly enforced.

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

Makeup Exam Policy: To properly report your absence from a midterm or final exam, please review and follow the required steps under the DMS Examination Policy found here:

- http://math.njit.edu/students/policies_exam.php

Cellular Phones: All cellular phones and other electronic devices must be switched off and put away during all class times.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: **Spring 2019 Hours**)

Accommodation of Disabilities: Disability Support Services (DSS) 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 Disability Support Services at **973-596-5417** or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Disability Support 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 Disability Support Services (DSS) website at:

- <http://www5.njit.edu/studentssuccess/disability-support-services/>

Important Dates (See: **Spring 2019 Academic Calendar, Registrar**)

Date	Day	Event
January 22, 2019	T	First Day of Classes
February 1, 2019	F	Last Day to Add/Drop Classes
March 17 - 24, 2019	Su - Su	Spring Recess - No Classes, NJIT Open
April 8, 2019	M	Last Day to Withdraw
April 19, 2019	F	Good Friday - No Classes, NJIT Closed
May 7, 2019	T	Friday Classes Meet/ Last Day of Classes
May 8 & 9, 2019	W & R	Reading Days
May 10 - 16, 2019	F - R	Final Exam Period

Course Outline

Online Homework Assignments will be posted on WileyPlus.

Week	Class	Lec.	Section	Topic	Exercise Problems for Additional HW/ Practice
WEEK 1 1/22 (T)	1	1	6.1	Descriptive statistics: Numerical Summaries of data: Sample Mean, Sample Variance, Sample Standard Deviation, Range	6.8, 6.9, 6.12, 6.14
	2	2	6.2	Descriptive statistics: Stem and Leaf Diagram, Mean, Median, Quartiles, Interquartile Range	6.30, 6.32, 6.36, 6.38, 6.44
WEEK 2 1/29 (T)	3	3	6.3, 6.4	Descriptive statistics: Histograms, Boxplot	6.46, 6.54, 6.69, 6.74, 6.79, 6.80
	4	4	2.1, 2.2, 2.3	Probability: Sample Spaces and Events; Interpretations and Axioms of Probability; Addition rules	2.35, 2.41, 2.42, 2.45, 2.47 ab, 2.58, 2.60, 2.67, 2.70, 2.71, 2.76, 2.84, 2.86, 2.88
WEEK 3 2/5 (T)	5	5	2.4, 2.5, 2.6	Probability: Conditional Probability; Multiplication and Total Probability Rules; Independence	2.99, 2.100, 2.102, 2.105, 2.106, 2.107, 2.108, 2.124, 2.126, 2.128, 2.145, 2.146, 2.148, 2.149, 2.156, 2.157, 2.187, 2.208, 2.224
	6	6	2.7	Probability: Bayes' theorem	2.166, 2.170, 2.172, 2.173, 2.185, 2.220
WEEK 4 2/12 (T)	7	7	3.1, 3.2, 3.3	Discrete Random Variables and Probability Distributions: Discrete Random Variables; Probability Distributions and Probability Mass Functions; Cumulative Distribution Functions	3.18, 3.24, 3.25, 3.30, 3.39, 3.40, 3.45, 3.50, 3.51, 3.197, 3.201
	8	8	3.4, 3.5	Discrete Random Variables and Probability Distributions: Mean and Variance of a Discrete Random Variable; Discrete Uniform Distribution	3.60, 3.62, 3.64, 3.78, 3.81, 3.83, 3.175
WEEK 5 2/19 (T)	9	9	3.6 3.7	Discrete Random Variables and Probability Distributions: Binomial Distribution; Geometric Distribution only from Section 3.7	3.95, 3.100, 3.101, 3.102, 3.103, 3.104, 3.106, 3.119, 3.120, 3.123, 3.198
	10	10	3.9	Discrete Random Variables and Probability Distributions: Poisson Distribution	3.160, 3.163, 3.164, 3.167, 3.168, 3.190, 3.192
WEEK 6 2/26 (T)	11			REVIEW FOR EXAM #1	
				MIDTERM EXAM I: WEDNESDAY ~ FEBRUARY 27, 2019	
	12	11	4.1, 4.2, 4.3	Continuous Random Variables and Probability Distributions: Continuous Random Variables; Probability distributions and Probability Density Functions; Cumulative Distribution Functions	4.1, 4.4, 4.5, 4.6, 4.8, 4.9, 4.17, 4.18, 4.19, 4.29
WEEK 7 3/5 (T)	13	12	4.4, 4.5	Continuous Random Variables and Probability Distributions: Mean and Variance of a Continuous Random Variable; Continuous Uniform Distribution	4.35, 4.36, 4.38, 4.39, 4.52, 4.53, 4.54, 4.56
	14	13	4.8	Continuous Random Variables and Probability Distributions: Exponential Distribution	4.116ab, 4.117, 4.119, 4.121, 4.125, 4.126, 4.132
WEEK 8 3/12 (T)	15	14	4.6	Continuous Random Variables and Probability Distributions: Normal distribution	4.63, 4.66, 4.71, 4.72, 4.76, 4.78
	16	15	4.7	Continuous Random Variables and Probability Distributions: Normal Approximation to the	4.98, 4.99, .4.103

				Binomial and Poisson Distributions	
3/17(S) TO 3/24(S)				SPRING RECESS (NO CLASSES)	
WEEK 9 3/26 (T)	17	16	7.1-7.2	Point estimation of Parameters and Sampling Distributions: Point Estimation; Sampling Distributions and the Central Limit Theorem	7.5, 7.7, 7.8, 7.11, 7.12
	18	17	8.1	Statistical Intervals for a Single Sample: Confidence interval on the Mean of a Normal distribution, Variance Known	8.10, 8.11, 8.12, 8.13, 8.21
WEEK 10 4/2 (T)	19	18	8.2	Statistical Intervals for a Single Sample: Confidence Interval on the Mean of a Normal Distribution, Variance Unknown	8.25, 8.30, 8.31, 8.38bc, 8.39 bc
	20	19	8.3	Statistical Intervals for a Single Sample: Confidence intervals on the Variance and Standard deviation of a Normal Distribution	8.47, 8.48, 8.49, 8.50, 8.51
(WITHDRAWAL DEADLINE: MONDAY, APRIL 8, 2019)					
WEEK 11 4/9 (T)	21	20	8.4	Statistical Intervals for a Single Sample: Large-Sample Confidence Interval for a Population Proportion	8.60, 8.61, 8.62, 8.63, 8.64
	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	9.31, 9.32, 9.35, 9.36, 9.37
WEEK 12 4/16 (T)	23			REVIEW FOR EXAM #2	
				MIDTERM EXAM II: WEDNESDAY - APRIL 17, 2019	
	24	22	9.1-9.2	Tests of Hypotheses for a Single Sample: Tests on the Mean of a Normal Distribution, Variance Known	9.15, 9.43, 9.47, 9.48, 9.49
WEEK 13 4/23 (T)	25	23	9.3.1	Tests of Hypotheses for a Single Sample: Tests on the Mean of a Normal Distribution, Variance Unknown	9.52, 9.53, 9.55, 9.56, 9.63a, 9.64a
	26	24	9.5	Tests of Hypotheses for a Single Sample: Tests on a Population Proportion	9.92, 9.93, 9.94, 9.95
WEEK 14 4/30 (T)	27	25	10.4	Statistical Inference for Two Samples: Paired t-test	10.53, 10.54, 10.55
			10.1	Inference on the Difference in Means of Two Normal Distributions, Variances known	10.1ab, 10.2ab, 10.3 ab, 10.6ab, 10.7ab
	28	26	11.2	Simple Linear Regression and Correlation: Simple Linear Regression	11.1ab, 11.2 ab, 11.8ab
				REVIEW FOR FINAL EXAM	
WEEK 15 5/7 (T)				MAY 7(TUESDAY): FRIDAY CLASSES MEET	
				REVIEW FOR FINAL EXAM	
				READING DAY 5/8 AND 5/9 (W & R)	
5/10 - 5/16				FINAL EXAM WEEK	

*Updated by Professor P. Natarajan - 1/15/2019
Department of Mathematical Sciences Course Syllabus, Spring 2019*