Mathematical Sciences Syllabi   NJIT Syllabi

Fall 2019

MATH 333-001: Probability and Statistics

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MATH 333: Probability and Statistics
Fall 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 333-001	Professor S. Mahmood
Math 333-003	Professor D. Schmidt
Math 333-007	Professor C. Carfora
Math 333-009	Professor S. Mahmood
Math 333-013	Professor K. Carfora
Math 333-017	Professor M. Michal
Math 333-023	Professor P. Natarajan
Math 333-029	Professor P. Natarajan
Math 333-101	Professor J. Porus

Office Hours for All Math Instructors: Fall 2019 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) 978-1119409533 (Text with WileyPlus Registration Card) 2) 978-1119400226 (Standalone WileyPlus Registration Card)

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, November 11, 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

Upon successful completion of this course, the student will be able to:

- 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	October 2, 2019
Common Midterm Exam II	November 13, 2019
Final Exam Period	December 14 - 20, 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: Fall 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:

- https://www.njit.edu/studentsuccess/accessibility/

Important Dates (See: Fall 2019 Academic Calendar, Registrar)

Date	Day	Event
September 3, 2019	T	First Day of Classes
September 13, 2019	M	Last Day to Add/Drop Classes
November 11, 2019	M	Last Day to Withdraw
November 26, 2019	T	Thursday Classes Meet
November 27, 2019	W	Friday Classes Meet

November 28 - December 1, 2019	R - Su	Thanksgiving Recess
December 11, 2019	W	Last Day of Classes
December 12 & 13, 2019	R & F	Reading Days
December 14 - 20, 2019	Sa - F	Final Exam Period

Course Outline

Week	Class	Lec.	Section	Topic
WEEK 1 9/3 (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 9/10 (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 9/17 (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 9/24 (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 10/1 (T)	9			**REVIEW FOR EXAM #1**
				COMMON EXAM 1: OCTOBER 2, 2019
	10	9	3.5, 3.6	*Discrete Random Variables and Probability Distributions:* Binomial Distribution; Geometric Distribution only from Section 3.6
WEEK 6 10/8 (T)	11	10	3.8	*Discrete Random Variables and Probability Distributions:* Poisson Distribution
	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 10/15 (T)	13	12	4.4, 4.5	*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 10/22 (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 10/29(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 11/5(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, NOVEMBER 11, 2019
WEEK 11 11/12(T)	21			**REVIEW FOR EXAM #2**
				COMMON EXAM 2: NOVEMBER 13, 2019
	22	20	8.4	*Statistical Intervals for a Single Sample*: Large-Sample Confidence Interval for a Population Proportion
WEEK 12 11/19(T)	23	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 13 11/26(T)	24	22	9.1-9.2	*Tests of Hypotheses for a Single Sample*: Tests on the Mean of a Normal Distribution, Variance Known
	25	23	9.3.1	*Tests of Hypotheses for a Single Sample*: Tests on the Mean of a Normal Distribution, Variance Unknown
	<11/26 (T):(Thursday Classes Meet) 11/27(W): (Friday Classes Meet)			
				THANKSGIVING RECESS: 11/28 (R) TO 12/1 (S)
WEEK 14 12/3 (T)	26	24	9.5	*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 12/10 (T)	28	26	11.2	*Simple Linear Regression and Correlation*: Simple Linear Regression **REVIEW FOR FINAL EXAM**
				READING DAYS: 12/12 (R) AND 12/13 (F)
				FINAL EXAM WEEK: 12/14 - 12/20