MATH 345-002: Multivariate Distributions
Spring 2020 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: Instruction will gear toward concepts and methods such as discrete and continuous multivariate distributions and their moments, multivariate distributions including multivariate normal and multinominal distributions, order statistics, conditional probability and the use of conditioning, discrete time Markov chains and their examples, discrete time branching processes, homogeneous and nonhomogeneous Poisson processes.

Number of Credits: 3

Prerequisites: Math 244 or Math 333 with a grade of C or better.

Course-Section and Instructors

Course-Section	Instructor
Math 345-002	Professor S. Subramanian

Office Hours for All Math Instructors: Spring 2020 Office Hours and Emails

Required Textbook:

Title	*A First Course in Probability*
Author	Ross
Edition	9th
Publisher	Publisher
ISBN #	978-9332519077
Notes	Pearson

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 6, 2020**. It will be strictly enforced.

COURSE GOALS

Student Learning Outcomes - On successful completion, students will be able to demonstrate understanding of the following topics:

- Multivariate distributions
- Order statistics
- Conditioning
- Poisson process
- Discrete time Markov chains
- Branching processes
- Stochastic computations

Assessment: Will be based on regular homework, two midterm exams, and one 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%
(2) Midterm Exams	50%
Final Exam	35%

Your final letter grade will be based on the following tentative curve.

A	90 - 100	C	68 - 74
B+	85 - 89	D	50 - 67
B	80 - 84	F	0 - 49
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 Policy: Homework assignments are due within a week unless announced otherwise by instructor. Late homework will not be accepted.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. Exams are held on the following days:

Midterm Exam I	February 28, 2020
Midterm Exam II	April 10, 2020
Final Exam Period	May 8 - 14, 2020

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.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Spring 2020 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.

All students must familiarize themselves with and adhere to the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. The Department of Mathematical Sciences takes these policies very seriously and enforces them strictly.

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 Kupfrian Hall, Room 201. 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: Spring 2020 Academic Calendar, Registrar)

Date	Day	Event
January 21, 2020	T	First Day of Classes
January 31, 2020	F	Last Day to Add/Drop Classes
March 15 - 22, 2020	Su-Su	Spring Recess: No Classes/ University Open
April 6, 2020	M	Last Day to Withdraw
April 10, 2020	F	Good Friday - University Closed
May 5, 2020	T	Friday Classes Meet - Last Day of Classes
May 6 & 7, 2020	W & R	Reading Days
May 8 - 14, 2020	F - R	Final Exam Period

Course Outline

Week	Lecture	Sections	Topic
1	Week of 1/20		Review of probability
2	Week of 1/27	6.1 – 6.2	Joint distributions, independence
3	Week of 2/3	6.3	Sums of independent random variables
4	Week of 2/10	6.4 – 6.5	Conditional distributions

5	Week of 2/17	6.6	Order statistics; **MIDTERM EXAM 1**
6	Week of 2/24	6.7 – 6.8	Functions of random variables; Exchangeable random variables
7	Week of 3/2	7.1 – 7.3	Expectation of sums of random variables; Moments
8	Week of 3/9	7.4 – 7.6	Covariance, variance of sums and correlations; Conditional expectation
9	Week of 3/23		Review and **MIDTERM EXAM 2**
10	Week of 3/30	7.7 – 7.8	Moment generating functions; multivariate normal distribution
11	Week of 4/6	8.1 – 8.4	Limit Theorems: Chebyshev's, CLT, strong law of large numbers
12	Week of 4/13	8.5; 9.1	Other inequalities; Poisson processes
13	Week of 4/20	9.1	Poisson processes
14	Week of 4/27	9.2	Markov chains
15	Week of 5/4		Markov chains