

MATH 341: Statistical Methods I

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: Covers applications of classical statistical inference. Topics include transformation of variables, moment generating technique for distribution of variables, introduction to sampling distributions, point and interval estimation, maximum likelihood estimators, basic statistical hypotheses and tests of parametric hypotheses about means of normal populations, chi-square tests of homogeneity, independence, goodness-of-fit. Effective From: Spring 2009.

Number of Credits: 3

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

Course-Section and Instructors

Course-Section	Instructor
Math 341-002	Professor S. Dhar

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

Required Textbook:

Title	<i>Mathematical Statistics with Applications</i>
Author	Wackerly, Mendenhall, and Scheaffer
Edition	7th
Publisher	Thomson Brooks/Cole
ISBN #	978-0495110811

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 Outcomes

- Read mathematical statistics methods.
- Do mathematical statistics problem solving.
- Gain ideas to do statistical computations.
- Perform estimation techniques to capture information from data and into their analysis.
- Use MOM, MLE, MVUE to do parameter estimation and inference.
- Use Chi-squared test to evaluate the homogeneity of populations.
- Use Chi-squared test to evaluate the independence of categorical variables.
- Use Chi-squared test to evaluate the goodness-of-fit of data to a specified distribution.

Advice on how to read/approach the materials: Always read the material covered in class again on your own immediately before the next class. Reading means understanding each sentence in the class notes and textbook and then solving problems on them effectively on your own. Next, be able to solve most of the remaining related problems on your own.

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	15%
Class Participation (see rubric, below)	15%
Midterm Exam I	20%
Midterm Exam II	20%
Final Exam	30%

Your final letter grade will be based on the following tentative curve. **NOTE:** Your final letter grade will be based on a curve that ensures at least few A's. Practice problems, HW and Quiz assignments are posted on Math 341 Course Moodle page. Note that Homework assignments may be modifications of questions in the textbook. Homework is generally due within a week unless announced otherwise by the instructor. Solutions to the assignments will be handed out in class and discussed (see the Math 341 Course Moodle page). Late homework cannot be accepted, since the solutions are already handed out.

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. Absence will affect the grade due to class participation requirement (15% of the grade).

Homework Policy: No late homework will be accepted.

Calculator Policy: Calculators are allowed but should be basic, without graphing capabilities, algebraic simplification capabilities, formula-storing capabilities and without other such capabilities.

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	March 7, 2019
Midterm Exam II	April 11, 2019
Final Exam Period	May 10 - 16, 2019

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.

Laptops: Computers and other communication devices should remain closed during lecture time, exams and quizzes.

Grading: Any complaints regarding grading have to be presented immediately after receiving the graded test, quiz, HW or exam in-class.

Looking into neighbors work during exams: Keeping eyes hidden using hats, caps, etc., from the proctor, but not from the neighbors work during exams is not allowed.

Wandering: Going in and out of the classroom often is not allowed. (Let instructor know ahead of time that if one is coming late or leaving a classroom in session early due to extenuating circumstances).

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 2019 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](tel: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

Lecture (Date)	Sections	Topic
1 (1-22)	5.2	Bivariate and Multivariate Probability Distributions
2 (1-24)	5.3, 5.4	Marginal and Conditional Probability Distributions; Independent R.V.
3 (1-29)	5.5, 5.7	Expected Values and Covariance
4 (1-31)	6.2, 6.3	Method of Distribution Functions
5 (2-05)	6.4	Method of Transformations
6 (2-07)	4.9, 6.5	Moments and Moment Generating Functions; Method of Moments (MOM)
7 (2-12)	6.6	Two Variables Transformations
8 (2-14)	6.7, 7.1	Order Statistics, Intro to Sampling Distributions
9 (2-19)	7.2	Sampling Distributions related to the Normal Distribution
10 (2-21)	7.3	Central Limit Theorem
11 (2-26)	8.2, 8.3	Bias and Mean Square Error of Point Estimators
12 (2-28)	9.5	Minimum Variance Unbiased Estimators (MVUE)
13 (3-05)	REVIEW EXAM I	
14 (3-07)	EXAM I , THURSDAY, MARCH 07, 2019	
15 (3-12)	9.7	Maximum Likelihood Estimation (MLE)
16 (3-14)	8.6, 8.7	Confidence Intervals
MARCH 17 - 24, 2019, SU-SU / SPRING RECESS ~ NO CLASSES ~ UNIVERSITY OPEN		
17 (3-26)	8.8, 8.9	Confidence Intervals
18 (3-28)	10.2, 10.3	Hypothesis Testing Basics
19 (4-02)	10.4, 10.6	Type II error; p-values
20 (4-04)	10.8	Small Sample Hypothesis Testing
21 (4-09)	REVIEW EXAM II	
22 (4-11)	EXAM II, THURSDAY, APRIL 11, 2019	
23 (4-16)	10.1	Power of Tests; Neyman-Pearson Lemma
24 (4-18)	10.1	Most Powerful Test
25 (4-23)	14.1, 14.2	Categorical Data; Chi-Squared Test
26 (4-25)	14.3	Goodness of Fit Test
27 (4-30)	14.4	Contingency Tables
28 (5-02)	REVIEW FINAL	

Practice problems, HW and Quiz assignments are posted on Math 341 Course Moodle page. Note that Homework assignments may be modifications of questions in the textbook.

Grade Criteria for Class Participation (out of a maximum of 4)

Once the student names are uniquely identified, from there onwards each student will receive a score of 0 to 4 at the end of the each class according to the following criteria:

0: Student is absent (please give proof of extenuating circumstance). Student has sustained attention on laptop/electronic devices. Not participating in the class at all. She/he is disruptive and says little or nothing in class. Contributions in class reflect inadequate preparation. Ideas offered are seldom substantive, provides few if any insights, and never a constructive direction for the class. Integrative comments are absent. If this person were not a member of the class, valuable class-time would be saved.

1: Student is present and not disruptive. Tries to respond when called on but does not offer much. Student demonstrates very infrequent involvement in class discussion. This person says little or nothing in class. Hence, there is not an adequate basis for evaluation. If this person were not a member of the class, the quality of discussion would not be changed.

2: Student demonstrates adequate preparation: knows basic facts, but does not show evidence of trying to interpret or analyze them. She/he offers straightforward information (e.g., straight from the textbook), without elaboration or very infrequently (perhaps once a class). Does not offer to contribute to discussion, but contributes to a moderate degree when called on. Student demonstrates sporadic involvement. Contributions in class reflect satisfactory preparation. Ideas offered are sometimes substantive, provides generally useful insights but seldom offer a new direction for the discussion. If this person were not a member of the class, the quality of discussion would be diminished somewhat.

3: Student demonstrates good preparation: knows covered course material well, has thought through implications of them. She/he offers interpretations and analysis of course material (more than just facts) to class. Student contributes well to discussion in an ongoing way: responds to other students' points, thinks through their own points, questions others in a constructive way, offers and supports suggestions that may be counter to the majority opinion. Student demonstrates consistent ongoing involvement. Contributions in class reflect thorough preparation. Ideas offered by the student are usually substantive; provide good insights, and sometimes direction for the class. If this person were not a member of the class, the quality of discussion would be diminished.

4: Student demonstrates excellent preparation: has analyzed covered course material exceptionally well, relating it to readings and other material (e.g., readings, course material, etc.). She/he offers analysis, synthesis, and evaluation of covered course material, e.g., puts together pieces of the discussion to develop new approaches that take the class further. Student contributes in a very significant way to ongoing discussion: keeps analysis focused, responds very thoughtfully to other students' comments, contributes to the cooperative argument-building, suggests alternative ways of approaching material and helps class analyze which approaches are appropriate, etc. She/he demonstrates ongoing very active involvement. Contributions in class reflect exceptional preparation. Ideas offered are always substantive, and provide one or more major insights as well as direction for the class. If this person were not a member of the class, the quality of discussion would be diminished markedly.

The average score out of the maximum of 4 is used to calculate the class participation score.