

MATH 699: Design and Analysis of Experiments *Spring 2021 Graduate 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: Statistically designed experiments and their importance in data analysis, industrial experiments. Role of randomization. Fixed and random effect models and ANOVA, block design, latin square design, factorial and fractional factorial designs and their analysis. Effective From: Spring 2006

Number of Credits: 3

Prerequisites: Math 662.

Course-Section and Instructors

Course-Section	Instructor
Math 699-102	Professor S. Dhar

Office Hours for All Math Instructors: [Spring 2021 Office Hours and Emails](#)

Required Textbooks:

Title	<i>Design and Analysis of Experiments</i>
Author	Montgomery
Edition	10th
Publisher	John Wiley & Sons
ISBN #	978-1119-49244-3

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, April 5, 2021**. It will be strictly enforced.

COURSE GOALS

Objectives: Statistically designed experiments and their importance in data analysis, industrial experiments.

Role of randomization. Fixed and random effect models and ANOVA, block design, Latin square design, factorial and fractional factorial designs and their analysis.

Course Outcomes

- Read Design of Experiment methods.
- Do Design of Experiments statistical problem solving and analysis.
- Gain ideas to do Design of Experiments statistical computations.
- Be conscientious of arriving at the best method (when to use the appropriate design) for setting up a Design for an Experimental, conduct (randomization) and analysis.

Course Assessment: Understanding of the topics at the level at which one is able to design, conduct, and analyze statistical data is assessed.

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	10%
Class Participation (see rubric)	10%
Project	25%
Midterm Exam	25%
Final Exam	30%

Grading Scale: Your final letter grade will be **BASED ON A CURVE** that ensures at least few A's.

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.

Online Exam Policy: [Exams Instruction using Respondus Lockdown Monitor, Webcam, and Webex.](#)

Students have to install Lockdown Browser in order to take the exam using Lockdown Browser and will need a webcam and microphone (built in or external)

- URL for download: <http://www.respondus.com/lockdown/download.php?id=264548414> (Links to an external site.)
- Locate the "LockDown Browser" shortcut on the desktop and double-click it. (For Mac users, launch "LockDown Browser" from the Applications folder.)
- Choose NJIT Canvas from the drop-down list.
- You will be brought to the NJIT Canvas login page within the LockDown Browser.
- Under "My courses," click on the course in which you would be taking the exam/quiz that requires the LockDown Browser.
- After you enter the course, find the exam or quiz and click on it.

Your NJIT ID is required for taking the Exams through Lockdown Browser and Respondus.

NOTE THAT YOU ARE REQUIRED TO STAY WITH RESPONDUS LOCK DOWN MONITOR WITH WEBCAM AND WEBEX UNTIL THE END OF EXAM. OTHER THAN YOU BLANK PAPERS, MONITOR/PC/LAPTOP THERE SHOULD BE NOTHING ON THE TABLE ON WHICH YOU ARE TAKING EXAM. (No calculators either because a built in scientific calculator is provided via Respondus)

During this exam, you shouldn't access other resources (a tablet, notes, books, etc.) or communicate with other people. Please stay in your seat and focus on the computer screen until the exam is complete. If an interruption occurs, briefly explain what happened by speaking directly to your webcam. And, finally, remember that you cannot exit the exam until all questions are completed and submitted for grading until the allotted end of exam time. Don't wear sunglasses or hats with brims. Also, be sure to dress appropriately, as if you were in the classroom. Take the exam in a well-lit room and avoid backlighting, such as sitting with your back to a window. Hold your NJIT identification to the camera and select "Take Picture."

Students will be required to join a Webex meeting from their phone with their cameras on, and to access the exam through LockDown Browser on a Mac or Windows PC with webcam. Students must focus their phone camera on their hands and papers which give the exam solutions, and can be instructed to reposition the camera or show items of concern. Note that LockDown Browser does not work on Chromebooks, and there are significant number of technical problems with iPad use.

Download Canvas app on your phone. It will help you upload your exam work.

It is required we login to the Webex meeting using our cell phone in addition to the Respondus lock down monitor with webcam. The Webex link for Wednesday night classes including exam days will be provided in Announcements, Canvas. Note that your cell phone must provide authentication of yourself as an NJIT student, using your UCID and Password.

There will be a practice exam (not for grades) before the midterm exam.

Those who need practice to log in to the Webex meeting using phone can do so during office hours and also during our next Wednesday night class. THE PRACTICE EXAM (not for grades) USING RESPONDUS LOCK DOWN MONITOR AND WEBCAM WILL BE MADE AVAILABLE THROUGH CANVAS UNTIL THE DAY OF FINAL EXAM. Please give your answer through Assignment (one will be created for this purpose by the instructor) in Canvas using the Assignment upload ONLY in the exams and not where the questions are described because it impossible to type math within this environment.

Calculator: Bring a scientific basic calculator to all the lectures and exams. However, you are not allowed to bring calculators that have graphic display/ storage capacity (only simple calculators are allowed) in exams and quizzes.

Further Assistance: For further questions, students should contact their Instructor. All Instructors have regular office hours during the week. These office hours are listed at the link above.

Cellular Phones: Cell phones for communicating (e.g. texting, etc.) during lecture in the classroom is not allowed. All cellular phones and beepers must be switched off during all class times.

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

Wandering in and out of the classroom is not allowed.

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

Midterm Exam	March 31, 2021, 6:00 pm
Final Exam Period	May 12, 2021, 6:00 pm to 8:30 pm

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: 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 during all class times.

ADDITIONAL RESOURCES

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 are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of Office of Accessibility Resources and 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 Office of Accessibility Resources and Services 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 Office of Accessibility Resources and Services (OARS) website at:

- <https://www.njit.edu/studentssuccess/accessibility/>

Important Dates (See: [Spring 2021 Academic Calendar](#), Registrar)

Date	Day	Event
January 19, 2021	T	First Day of Classes
January 23, 2021	S	Saturday Classes Begin
January 25, 2021	M	Last Day to Add/Drop Classes
March 14 - March 21, 2021	Su - Su	Spring Recess - No Classes
April, 2, 2021	F	Good Friday - No Classes
April 5, 2021	M	Last Day to Withdraw
May 4, 2021	T	Friday Classes Meet
May 4, 2021	T	Last Day of Classes
May 5 & May 6, 2021	W & R	Reading Days
May 7 - May 13, 2021	F - R	Final Exam Period

Course Outline

Lecture	Section	Topic
1	1/20	Introduction and Review
2	1/27	Simple Comparative Experiments
3	2/3	Experiments with a Single Factor: ANOVA - Part I
4	2/10	Experiments with a Single Factor: ANOVA - Part II
5	2/17	Randomized Block Designs
6	2/24	Latin Square Design, Greco-Latin Square

7	3/3	Balanced Incomplete Block Designs
8	3/10	Factorial Designs & Projects Due
9	3/17	No Class (Spring Break)
10	3/24	Two-power-k Factorial Designs & Projects Due
11	3/31	MIDTERM EXAM
12	4/7	Blocking and Confounding in Two-power-k Factorial Designs & Projects Due
13	4/14	Two-Level Fractional Factorial Designs & Projects Due
14	4/21	Projects Due (Time permits: Additional Design and Analysis Topics for Factorial & Fractional Factorial Designs & Selected Advanced Topics)
15	4/28	Course Review
		FINAL EXAM MAY 12, 2021, 6:00 PM TO 8:30 PM

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.

*Updated by Professor S. Dhar - 1/10/2021
Department of Mathematical Sciences Course Syllabus, Spring 2021*
