MATH 661: Applied Statistics
Spring 2024 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: Role and purpose of applied statistics. Data visualization and use of statistical software used in course. Descriptive statistics, summary measures for quantitative and qualitative data, data displays. Modeling random behavior: elementary probability and some simple probability distribution models. Normal distribution. Computational statistical inference: confidence intervals and tests for means, variances, and proportions. Linear regression analysis and inference. Control charts for statistical quality control. Introduction to design of experiments and ANOVA, simple factorial design and their analysis. MATH 661 and MATH 663 cannot both be used toward degree credits at NJIT.

Number of Credits: 3

Prerequisites: MATH 112

Course-Section and Instructors:

Course-Section	Instructor
Math 661-852	Professor A. Pole

Office Hours for All Math Instructors: Spring 2024 Office Hours and Emails

Required Textbook:

Title	*Introduction to the Practice of Statistics*
Author	Moore, McCabe, and Craig
Edition	10th
Publisher	MacMillan Learning
ISBN #	1. E-book ISBN:9781319377656 2. Loose-Leaf ISBN:9781319383985 3. Paperback ISBN:9781319244446

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** We will be using the MacMillan Achieve product for some assignments – *you will need to purchase access to* Achieve *(which includes the eBook, solutions manual, applets for practicing tools, exercises with feedback).*

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 1, 2024**. It will be strictly enforced.

The course is offered through Canvas. Canvas accessibility statement

COURSE GOALS

Course Objectives:

- This course will acquaint students with statistical techniques, with emphasis on applications: Turning data into information.
- Assessment of objectives is achieved through homework assignments and two examinations: a midterm exam and a comprehensive final exam.

Course Outcomes

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

- Explain and apply statistical methods for displaying, summarizing and describing data
- Explain and perform basic probability calculations
- Define and explain sampling distributions and the central limit theorem
- Perform statistical calculation of sampling distributions
- Perform statistical analysis including estimation, hypothesis testing, and analysis of variance
- Communicate results of data examination, analysis, and inference.

Assignments

Homework assignments will be posted early each week, with the due date set as Tuesday evening of the subsequent week. Assignments are in three parts: two "assignments" and one "discussion". The assignment labeled "A" is an Achieve assignment. Those are largely multiple choice/compute and enter a value/fill in the missing term. Those are graded by the Achieve algorithm. The other assignment requires you to write solutions, scan and convert to pdf, and upload to Canvas for me to grade. The discussion is to get you "talking" with each other about the course material.

For the uploaded assignment responses, PDF format is required. A naming convention is also required:

    M661 <LAST NAME>, <FIRST NAME> HW<number>

(Some prefer to upload each question separately – that is a help to me in navigating your work – just be sure to add the question number, something like "Q3", to the file names.)

Assignments will usually be graded by Thursday and marked up files available in Canvas by the end of the day. Solution notes are posted at the same time. The assignments include a substantial amount of practical work – you will need a computing environment to accomplish the tasks. Choice of computational tools is up to you: see the note posted on the Canvas course page.

The weekly homework assignments will include exercises to:

- Practice the tools: including boxplots, histograms, scatterplots for summarizing and displaying data
- Practice the calculations: computing probabilities by applying the rules of probability for dealing with compound events formed by combining simple events; applying the central limit theorem to sample data; compute summary statistics of sampling distributions
- Practice the statistical analysis of single variable data: computing confidence intervals; testing statistical hypotheses
- Practice the statistical analysis of multi-variable data: assessing strength and direction of relationships; comparing data distributions in terms of shape, location, and spread
- Practice the statistical analysis of multi-sample data: computing confidence intervals for differences in means and proportions; testing statistical hypotheses on differences in means and proportions.

Additional, optional, practice with data exploration and analysis tools, statistical analysis tools and inference techniques is available with the course text publisher application Achieve (student subscription required as part of the course).

Discussions

You are required to make an initial contribution by Sunday 11pm of the assignment week, to give others the opportunity to respond before the assignment deadline of Tuesday at 11pm. Instructor replies will be made throughout the discussion.

Questions

Questions about the course or material may be communicated through a Canvas discussion or email. (The Canvas email is preferred over direct NJIT email – an automatically generated course identifier is included.) Email questions are typically answered within 24 hours.

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	40%
Midterm Exam	30%
Final Exam	30%

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

A	90 - 100	C+	60 - 69
B+	80 - 89	C	50 - 59
B	70 - 79	F	0 - 49

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.

"NJIT policy requires that all midterm and final exams must be proctored, regardless of delivery mode, in order to

increase academic integrity. Note that this does not apply to essay or authentic based assessments. Effective beginning Fall semester 2019, students registered for a fully online course section (e.g., online or Hyflex mode) must be given the option to take their exam in a completely online format, with appropriate proctoring."

In this course, you will be required to use the following proctoring method to ensure academic integrity for exams. Please see NJIT's response to questions about online proctoring here. See below for more information about how exams will be proctored in this course.

Respondus Lockdown Browser and Monitor

Respondus LockDown Browser is a locked browser for taking assessments or quizzes in Canvas. It prevents students from printing, copying, going to another URL, or accessing other applications during a quiz. If a Canvas quiz requires that LockDown Browser be used, students will not be able to take the assessment or quiz with a standard web browser. Students may be required to use LockDown Browser with a webcam (Respondus Monitor), which will record students during an online exam.

The webcam can be built into your computer or can be the type that plugs in with a USB cable. Watch this short video to get a basic understanding of LockDown Browser and the webcam feature. A student Quick Start Guide (PDF) is also available.

Respondus Lockdown Browser and Monitor does not work with Linux and Chromebooks at this time. Please visit the Respondus Knowledge Base article on computer requirements for additional information. There are two quizzing engines currently available in Canvas, "classic" quizzes and "new" quizzes. Respondus works with both.

For "Classic" Quizzes in Canvas:

1. The LockDown Browser integration with Classic Quizzes still requires students to (1) manually start LockDown Browser, (2) log into Canvas, and (3) navigate to the quiz that requires LockDown Browser.
2. Download and install either the Windows version of LockDown Browser or the Mac version of LockDown Browser.
3. Once your download and installation has finished, locate the "LockDown Browser" shortcut on your desktop and double-click it. (For Mac users, launch "LockDown Browser" from the Applications folder.)
4. You will be brought to the Webauth Authentication Service page, where you can log in with your NJIT UCID and password.
5. From your Dashboard or under "Courses", click on the course in which you have to take the exam that requires LockDown Browser.
6. After you enter the course, find the exam and click on it.
7. Click the "Take the Quiz" button. Once a quiz has been started with LockDown Browser, you cannot exit until the "Submit Quiz" button is clicked.
8. If you are required to use a webcam (Respondus Monitor), you will be prompted to complete a Webcam Check and other Startup Sequence steps.

For "New" Quizzes in Canvas:

If a New Quizzes assessment requires the use of LockDown Browser, it will automatically launch from the student's regular browser session. At the end of the quiz, LockDown Browser will close, allowing the student to continue with their standard browser. To be clear, the LockDown Browser application must first be installed to the computer or device. But once installed, it will automatically launch (and close) as needed with New Quizzes.

1. Download and install either the Windows version of LockDown Browser or the Mac version of LockDown Browser.
2. Once your download and installation has finished, log into Canvas using your standard browser.
3. From your Dashboard or under "Courses", click on the course in which you have to take the exam that requires LockDown Browser.
4. After you enter the course, find the exam and click on it.

5. A new tab will open with a message stating "Assessment Loading". You will also see a pop-up window asking you to open Lockdown Browser. Click "Open Lockdown Browser".
6. Lockdown Browser will automatically launch and your quiz will be loaded into Lockdown Browser. Click "Begin" to take the quiz. Once a quiz has been started with LockDown Browser, you cannot exit until the "Submit Quiz" button is clicked.
7. If you are required to use a webcam (Respondus Monitor), you will be prompted to complete a Webcam Check and other Startup Sequence steps.

   More information and tips for ensuring a smooth experience can be found on this page.

Exams: There will be one exam during the semester and a cumulative final exam:

Midterm Exam	Week 8
Final Exam Period	May 3 - May 9, 2024

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.

Online Etiquette: Throughout this course, you are expected to be courteous and respectful to classmates by being polite, active participants. You should respond to discussion forum assignments in a timely manner so that your classmates have adequate time to respond to your posts. Please respect opinions, even those that differ from your own, and avoid using profanity or offensive language.

ADDITIONAL RESOURCES

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.

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 If you need an accommodation due to a disability please contact the Office of Accessibility Resources and Services at oars@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and 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 Office of Accessibility Resources and Services (OARS) website at:

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

Important Dates (See: Spring 2024 Academic Calendar, Registrar)

Date	Day	Event
January 16, 2024	Tuesday	First Day of Classes
January 22, 2024	Monday	Last Day to Add/Drop Classes
March 10, 2024	Sunday	Spring Recess Begins
March 16, 2024	Saturday	Spring Recess Ends
March 29, 2024	Friday	Good Friday - No Classes
April 1, 2024	Monday	Last Day to Withdraw
April 30, 2024	Tuesday	Friday Classes Meet
April 30, 2024	Tuesday	Last Day of Classes
May 1, 2024	Wednesday	Reading Day 1
May 2, 2024	Thursday	Reading Day 2
May 3 - May 9, 2024	Friday to Thursday	Final Exam Period

Course Outline

*Homework assignments will be posted each week, with the due date set as Tuesday evening of the subsequent week.

For most discussions (unless noted otherwise), initial replies are due on Sundays at 11 pm and responses to classmates due on Tuesday at 11 pm (for example, in Week 2, initial replies are due on 1/21 and responses to classmates on 1/23).

Week	Subject Topic	Assignment Schedule*
Week 1 01/16/24- 01/19/24	*Chapter 1. Looking at Data Distributions Part 1: Graphs*	Assignment #1, #1A, Discussion #1 posted Tuesday; due date 1/23 at 11 pm (Tuesday of Week 2)
Week 2 01/22/24- 01/26/24	*Chapter 1. Looking at Data Distributions Part 2: Measurements*	Assignment #2, #2A, Discussion #2 posted Tuesday; due date 1/30 at 11 pm (Tuesday of Week 3)
Week 3 01/29/24- 02/02/24	*Chapter 2. Looking at Data Relationships*	Assignment #3, #3A, Discussion #3 posted Tuesday; due date 2/6 at 11 pm (Tuesday of Week 4)
Week 4 02/05/24- 02/09/24	*Chapter 4. Probability: The Study of Randomness Part 1*	Assignment #4, #4A, Discussion #4 posted Tuesday; due date 2/13 at 11 pm (Tuesday of Week 5)
Week 5 02/12/24- 02/16/24	*Chapter 4. Probability: The Study of Randomness Part 2*	Assignment #5, #5A, Discussion #5 posted Tuesday; due date 2/20 at 11pm (Tuesday 11pm of Week 6).
Week 6	*Chapter 5. Sampling Distributions Part 1*	Assignment #6, #6A, Discussion #6 posted

02/19/24- 02/23/24		Tuesday; due date 2/27 at 11 pm (Tuesday of Week 7)
Week 7 02/26/24- 03/01/24	*Chapter 5. Sampling Distributions Part 2*	Discussion #7 posted Tuesday; due date 3/5 at **5 pm** (Tuesday of Week 8) *Discussion only this week: Midterm next week!*
Week 8 03/04/24- 03/08/24	*MIDTERM EXAM*	Assignment #7, #7A, posted Tuesday; due date 3/19 at 11 pm (Tuesday of Week 10)
Week 9 03/11/24- 03/15/24	*SPRING RECESS - NO CLASSES*	
Week 10 03/18/24- 03/22/24	*Chapter 6. Introduction to Inference Part 1*	Assignment #8, #8A, Discussion #8 posted Tuesday; due date 3/26 at 11 pm (Tuesday of Week 10)
Week 11 03/25/24- 03/29/24	*Chapter 6. Introduction to Inference Part 2*	Assignment #9, #9A, Discussion #9 posted Tuesday; due date 4/2 at 11 pm (Tuesday of Week 11)
Week 12 04/01/24- 04/05/24	*Chapter 7. Inference for Means*	Assignment #10, #10A, Discussion #10 posted Tuesday; due date 4/9 at 11 pm (Tuesday of Week 12)
Week 13 04/08/24- 04/12/24	*Chapter 8. Inference for Proportions*	Assignment #11, #11A, Discussion #11 posted Tuesday; due date 4/16 at 11 pm (Tuesday of Week 14)
Week 14 04/15/24- 04/19/24	*Chapter 9. Inference for Categorical Data*	Assignment #12, #12A, Discussion #12 posted Tuesday; due date 4/23 at 11 pm (Tuesday of Week 15)
Week 15 04/22/24- 04/26/24	*Chapter 12. One Way Analysis of Variance*	Discussion #13 posted Tuesday; due date 4/30 at **5 pm** (Tuesday of Week 16) *Discussion only this week: Final next week!*
Week 17 05/03/24- 05/09/24	*FINAL EXAMS* *Course exam date and time to be set by the registrar*	

*Note that the two lowest homework assignment grades are excluded from the calculation of the course grade.