

Summer 2023

## MATH 661, Summer 2023: Applied Statistics

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THE DEPARTMENT OF MATHEMATICAL SCIENCES

## MATH 661: Applied Statistics

### *Summer 2023 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.

**Number of Credits:** 3

**Prerequisites:**

**Course-Section and Instructors:**

Course-Section	Instructor
Math 661	Professor A. Pole

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

**Required Textbook:**

Title	<i>Introduction to the Practice of Statistics</i>
Author	Edition. D.S. Moore, G.P. McCabe and B. Craig
Edition	10th
Publisher	MacMillan Learning
ISBN #	1. E-book ISBN:9781319377656 2. Loose-Leaf ISBN:9781319383985 3. Paperback ISBN:9781319244446

\*\* 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:** Please see the **Summer 2023 Academic Calendar** for the last day to withdraw based on the summer session you are registered for.

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 and Assignments	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 5
Final Exam	Week 11

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

**Math Tutoring Center:** Located in the Central King Building, Lower Level, Rm. G11 (See: **Summer 2023 Hours**)

**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 Scott Janz, Associate Director of Disability Support Services at **973-596-5417** or via email at [scott.p.janz@njit.edu](mailto:scott.p.janz@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/>

Date	Day	Event
May 22, 2023	Monday	Full, First, and Middle Summer Session Begins
May 24, 2023	Wednesday	Last Day to Add/Drop for First

		<b>Summer Session</b>
May 26, 2023	Friday	Last Day to Add/Drop for <b>Middle Summer Session</b>
May 29, 2023	Monday	Last Day to Add/Drop for <b>Full Summer Session</b>
May 29, 2023	Monday	Memorial Day - University Closed/No Classes Scheduled
June 10, 2023	Saturday	Last Day to Withdraw from <b>First Summer Session</b>
June 16, 2023	Friday	Last Day to Withdraw from <b>Middle Summer Session</b>
June 16, 2023	Friday	Juneteenth - University Closed/No Classes Scheduled
June 26, 2023	Monday	Last Day of Classes for <b>First Summer Session</b>
June 30, 2023	Friday	Last Day to Withdraw from <b>Full Summer Session</b>
July 4, 2023	Tuesday	Independence Day - University Closed/No Classes Scheduled
July 5, 2023	Wednesday	<b>Second Summer Session Begins</b>
July 6, 2023	Thursday	Last Day to Add/Drop for <b>Second Summer Session</b>
July 17, 2023	Monday	Last Day of Classes for <b>Middle Summer Session</b>
July 20, 2023	Thursday	Last Day to Withdraw for <b>Second Summer Session</b>
August 8, 2023	Tuesday	Last Day of Classes for <b>Full and Second Summer Session</b>

## Course Outline

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

<b>Week</b>	<b>Subject Topic</b>	<b>Assignment Schedule*</b>
Week 1 5/22/23 - 5/26/23	<i>Chapter 1. Looking at Data Distributions/Chapter 2. Looking at Data Relationships</i>	Assignment #1, #1A, Discussion #1 posted Tuesday; due date Tuesday 11pm of Week 2
Week 2 5/29/23 - 6/2/23	<i>Chapter 4. Probability: The Study of Randomness</i>	Assignment #2, #2A, Discussion #2 posted Tuesday; due date Tuesday 11pm of Week 3

Week 3 6/5/23 - 6/9/23	<i>Chapter 4. Probability: The Study of Randomness (cont'd)/Chapter 5. Sampling Distributions</i>	Assignment #3, #3A, Discussion #3 posted Tuesday; due date Tuesday 11pm of Week 4
Week 4 6/12/23 - 6/16/23	<i>Chapter 5. Sampling Distributions (cont'd)</i>	Assignment #4, #4A, Discussion #4 posted Tuesday; due date Tuesday 6pm of Week 5
Week 5 6/19/23 - 6/23/23	<i>MIDTERM EXAM Chapter 6. Introduction to Inference</i>	Assignment #5, #5A, Discussion #5 posted after midterm exam; due date Tuesday 11pm of Week 6
Week 6 6/26/23 - 6/30/23	<i>Chapter 6. Introduction to Inference Chapter 7. Inference for Means</i>	Assignment #6, #6A, Discussion #6 posted Tuesday; due date Tuesday 11pm of Week 7
Week 7 7/3/23 - 7/7/23	<i>Chapter 7. Inference for Means</i>	Assignment #7, #7A, Discussion #7 posted Tuesday; due date Tuesday 11pm of Week 8
Week 8 7/10/23 - 7/14/23	<i>Chapter 8. Inference for Proportions</i>	Assignment #8, #8A, Discussion #8 posted Tuesday; due date Tuesday 11pm of Week 9
Week 9 7/17/23 - 7/21/23	<i>Chapter 9. Inference for Categorical Data/</i>	Assignment #9, #9A, Discussion #9 posted Tuesday; due date Tuesday 11pm of Week 10
Week 10 7/24/23 - 7/28/23	<i>Chapter 12. One Way Analysis of Variance</i>	Assignment #10, #10A, Discussion #10 posted Tuesday; due date Tuesday 6pm of Week 11
Week 11 7/31/23 - 8/4/23	<i>FINAL EXAM **TO BE SCHEDULED**</i>	

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

*Updated by Professor A. Pole - 5/08/2023  
Department of Mathematical Sciences Course Syllabus, Summer 2023*