MATH 661: Applied Statistics
Fall 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.

Number of Credits: 3

Prerequisites: MATH 112

Course-Section and Instructors:

Course-Section	Instructor
Math 661-103	Professor A. Pole

Office Hours for All Math Instructors: Office Hours and Emails

Required Textbook:

Title	*Introduction to the Practice of Statistics*
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: The last day to withdraw with a **W** is **Monday, November 11, 2024**. It will be strictly enforced.

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 Monday evening of the subsequent week. Assignments are in two parts. 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.

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).

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.

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

Midterm Exam	Week 8
Final Exam	Scheduled by the registrar (Exam Week)

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.

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 need an accommodation due to a disability, please contact the Office of Accessibility Resources and Services at oars@njit.edu, or visit Kupfrian Hall 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the office authorizing student accommodations is 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: Fall 2024 Academic Calendar, Registrar)

Date	Day	Event
September 2, 2024	Monday	Labor Day
September 3, 2024	Tuesday	First Day of Classes
September 9, 2024	Monday	Last Day to Add/Drop Classes
November 11, 2024	Monday	Last Day to Withdraw
November 26, 2024	Tuesday	Thursday Classes Meet
November 27, 2024	Wednesday	Friday Classes Meet
November 28 to December 1, 2024	Thursday and Sunday	Thanksgiving Recess - Closed
December 11, 2024	Wednesday	Last Day of Classes
December 12, 2024	Thursday	Reading Day 1
December 13, 2024	Friday	Reading Day 2
December 15 to December 21, 2024	Sunday to Saturday	Final Exam Period

Course Outline

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

Week	Subject Topic	Assignment Schedule*
Week 1 09/03/24- 09/06/24	*Chapter 1. Looking at Data Distributions Part 1: Graphs*	Assignment #1, #1A due date 9/9 at 6 pm (Monday of Week 2)
Week 2 09/09/24- 09/13/24	*Chapter 1. Looking at Data Distributions Part 2: Measurements*	Assignment #2, #2A due date 9/16 at 6 pm (Monday of Week 3)
Week 3 09/16/24- 09/20/24	*Chapter 2. Looking at Data Relationships*	Assignment #3, #3A due date 9/23 at 6 pm (Monday of Week 4)
Week 4 09/23/24- 09/27/24	*Chapter 4. Probability: The Study of Randomness Part 1*	Assignment #4, #4A due date 9/30 at 6 pm (Monday of Week 5)
Week 5 9/30/24- 10/04/24	*Chapter 4. Probability: The Study of Randomness Part 2*	Assignment #5, #5A due date 10/7 at 6pm (Monday 11pm of Week 6).
Week 6 10/07/24- 10/11/24	*Chapter 5. Sampling Distributions Part 1*	Assignment #6, #6A due date 10/14 at 6 pm (Monday of Week 7)
Week 7 10/14/24- 10/18/24	*Chapter 5. Sampling Distributions Part 2*	Midterm preparation * *Midterm next week!*
Week 8 10/21/24- 10/25/24	*MIDTERM EXAM*	Assignment #7, #7A due date 10/28 at 6 pm (Monday of Week 9)
Week 9 10/28/24- 11/01/24	*Chapter 6. Introduction to Inference Part 1*	Assignment #8, #8A due date 11/4 at 6 pm (Monday of Week 10)
Week 10 11/04/24- 11/08/24	*Chapter 6. Introduction to Inference Part 2*	Assignment #9, #9A due date 11/11 at 6 pm (Monday of Week 11)
Week 11 11/11/24- 11/15/24	*Chapter 7. Inference for Means*	Assignment #10, #10A due date 11/18 at 6 pm (Monday of Week 12)
Week 12 11/18/24- 11/22/24	*Chapter 8. Inference for Proportions*	Assignment #11, #11A due date 12/2 at 6 pm (Monday of Week 14)
Week 13	*Thanksgiving - No Class*	*No assignment*

11/25/24- 11/29/24		
Week 14 12/02/24- 12/06/24	*Chapter 9. Inference for Categorical Data*	Assignment #12, #12A due date 12/9 at 6 pm (Monday of Week 15)
Week 15 12/09/24- 12/13/24	*Chapter 12. One Way Analysis of Variance*	Final Exam preparation * *Final next week!*
Week 16 12/16/24- 12/20/24	*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.

Updated by Professor A. Pole - 8/2024
Department of Mathematical Sciences Course Syllabus, Fall 2024