MATH 661: Applied Statistics
Spring 2025 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. 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 661-104	Professor T. Falconer

Office Hours for All Math Instructors: email me to set up a zoom meeting

Required Textbook:

Title	*Introduction to the Practice of Statistics*
Author	Moore, McCabe, and Craig
Edition	9th
Publisher	MacMillan Learning
ISBN #	1. E-book ISBN: 9781319377656 2. Loose-Leaf ISBN: 9781319383985

	3. Paperback ISBN: 9781319244446

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 7, 2025**. It will be strictly enforced.

COURSE GOALS

Course Objectives

This course will acquaint students with statistical techniques, with emphasis on applications.

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

- Explain probability theory and calculate probabilities
- Define and explain sampling distributions and the central limit theorem
- Perform statistical inferences including point estimation and interval estimation
- Be able to select the correct statistical test for the use case
- Exposed to scientific literature and understand how statistics is used in research

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:

Homeworks	20%
Class attendance and participation (including Journal Club)	20%
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.

Religious Observance: NJIT is committed to supporting students observing religious holidays. Students must

notify their instructors in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence.

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

Midterm Exam	TBD
Final Exam Period	May 10 – May 16, 2025

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 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.

AI Usage: Use of any LLM is specifically prohibited in answering homework sets. Pasting responses from LLMs into homework answers will result in failure in the class.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times unless being used for in-class work.

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.

Technical Support: Students may contact the IST Service Desk with any questions. Questions or problems can be submitted via web form by going to: https://servicedesk.njit.edu (Links to an external site.) and clicking on the "Report your issue online" link.

You may also call the IST Service Desk with any questions at 973-596-2900.

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 2025 Academic Calendar, Registrar)

Date	Day	Event
January 21, 2025	Tuesday	First Day of Classes
January 27, 2025	Monday	Last Day to Add/Drop Classes
March 16, 2025	Sunday	Spring Recess Begins
March 22, 2025	Saturday	Spring Recess Ends
April 3, 2025	Thursday	Wellness day
April 7, 2025	Monday	Last Day to Withdraw
April 18, 2025	Friday	Good Friday - No Classes
April 20, 2025	Sunday	Easter Sunday - No Classes Scheduled
May 6, 2025	Tuesday	Thursday Classes Meet
May 7, 2025	Wednesday	Friday Classes Meet
May 7, 2025	Wednesday	Last Day of Classes
May 8, 2025	Thursday	Reading Day 1
May 9, 2025	Friday	Reading Day 2
May 10 - May 16, 2025	Friday to Thursday	Final Exam Period

Course Outline

Changes or modifications, if any, will be announced in class.

Week	Subject Topic
Week 1	*Class introductions; R set-up; introduction to probability theory*
Week 2	*Continuation of probability theory: sets and probability mass function*
Week 3	*Introduction to statistics: brief history of experimentation; introduction to the Potential Outcomes Framework*

Week 4	*Introduction to Central Limit Theorem, common probability distributions and their attributes*
Week 5	*Statistics: correlations and introduction to hypothesis testing (section 2.3, chapter 4, chapter 6)*
Week 6	*Continuation of statistical testing of hypotheses (chapter 7, chapter 8)*
Week 7	*Continuation of statistical testing of hypotheses (chapter 9, chapter 12, 13)*
Week 8	*Mid-term examination (conducted during class time)*
Week 9	*Continuation of statistical testing of hypotheses, ANOVA*
Week 10	*ANCOVA, Univariate linear regression: fundamentals of regression (chapter 10)*
Week 11	*Univariate linear regression: fundamentals of regression (chapter 10)*
Week 12	*Multivariable linear regression (chapter 11)*
Week 13	*Multivariable linear regression (chapter 11)*
Week 14	*Logistic regression (chapter 14)*
Final Exam	*Final exam schedule to be set by Registrar*