MATH 661: Applied Statistics
Fall 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. 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 661-103	Professor P. Natarajan
Math 661-109	Professor P. Natarajan

Office Hours for All Math Instructors: Fall 2023 Office Hours and Emails

Required Textbook:

Title	*Introduction to the Practice of Statistics*
Author	Moore, McCabe, and Craig
Edition	10th
Publisher	MacMillan Learning
ISBN #	Paperback ISBN:9781319244446

Other Recommended and Reference Textbooks:

- Mathematical Statistics with Applications, 2nd Edition, Kandethody Ramachandran and Chris Tsokos ISBN: 978-0-12-417113-8
- Introductory Applied Biostatistics by Ralph D'Agostino, Lisa Sullivan, and Alexa Beiser, 1st edition, ISBN-10: 9780534423995, ISBN-13: 978-0534423995
- Applied Statistics and Probability for Engineers, Montgomery and Runger, Sixth edition, ISBN-10: 1118539710, ISBN-13: 978-1118539712
- An Introduction to Statistical Methods and Data Analysis, 7th Edition, Ott, R. L. and Longnecker, M. Fundamentals of Biostatistics, 8th Edition, Bernard Rosner

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, November 13, 2023**. It will be strictly enforced.

COURSE GOALS

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

Active learning and student engagement
Active learning techniques will be included throughout the semester to enhance student engagement and learning. These are supported in part through an active learning grant from NJIT Institute of Teaching Excellence (ITE) as part of the VITAL (Virtual Immersive Technologically Augmented Learning) initiative sponsored by the Martinson Foundation. These include tech tools such as digital whiteboard to enhance interaction with the instructor in real-time during in-class problem solving, and minute paper/exit ticket after the lecture for student feedback.

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

- Demonstrate understanding of various statistical methods for summarizing and displaying data.
- Demonstrate knowledge of basic probability and inference.
- Demonstrate understanding of distributions arising from random sampling.
- Demonstrate application of the central limit theorem to approximate sampling distributions.
- Perform statistical analysis such as point and interval estimation, hypothesis testing, regression, and analysis of variance.

Course Assessment: The assessment tools used will include homework assignments, in-class assignments and quizzes, mid-term exam, and a comprehensive/cumulative final exam.

Attendance and Participation: Attendance, class participation, and student feedback are important components in this class. Attendance will be recorded every class. Student feedback will be collected throughout the semester to improve the learning environment for students and help enhance student performance in the course. Student participation in class assignments will be monitored in real-time.

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, Class participation	15%
Quizzes	15%
Midterm Exam	35%
Final Exam	35%

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

A	90 - 100	**C+**	75 - 79
B+	85 - 89	**C**	60 - 74
B	80 - 84	**F**	0 - 59

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.

Homework and Quiz Requirements: Weekly homework problems will be assigned on Canvas. In addition to the online homeworks there will be Quizzes. Quizzes could be on paper or using an online proctored environment (Lock down browser with Respondus). http://www.respondus.com/lockdown/download.php?id=264548414

Software: Minitab/Excel will be used in the course for assignments/demonstration in class lectures. Laptop/computer would be needed for assessments.

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

Exams: There will be a proctored midterm exam during the semester and one cumulative/comprehensive proctored final exam during the final exam week. Use of Non-programmable/non-graphing calculator is permitted during the exam. Formula sheet and tables will be provided. Exams will be held on the following days:

Midterm Exam	October 24, 2023 (tentative) (for section 103) October 26, 2023 (tentative) (for section 109)
Final Exam	December 17 - December 23, 2023

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.

Calculator Policy: Only a basic (non-programmable and non-graphing) calculator is permitted during the exams. Calculators that can perform integration or differentiation operations are not allowed during exams.

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.

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 2023 Academic Calendar, Registrar)

Date	Day	Event
September 4, 2023	Monday	Labor Day
September 5, 2023	Tuesday	First Day of Classes
September 11, 2023	Monday	Last Day to Add/Drop Classes
November 13, 2023	Monday	Last Day to Withdraw
November 21, 2023	Tuesday	Thursday Classes Meet
November 22, 2023	Wednesday	Friday Classes Meet
November 23 to November 26, 2023	Thursday and Saturday	Thanksgiving Recess - Closed
December 13, 2023	Wednesday	Last Day of Classes
December 14, 2023	Thursday	Reading Day 1
December 15, 2023	Friday	Reading Day 2
December 17 to	Sunday to Saturday	Final Exam Period

December 23, 2023		

Course Outline

AL: Active learning activity (Interaction with the instructor in real-time during in-class problem solving using digital whiteboard and minute paper/exit ticket after the lecture)

Week	Lecture	Chapter	Topic	Active Learning activity (AL)
Week 1 9/5 (T) (section 103) 9/7 (R) (section 109)	1	1	Looking at Data-Distributions	AL
Week 2 9/12(T) (section 103) 9/14 (R) (section 109	2	1	Looking at Data-Distributions	AL
Week 3 9/19(T) (section 103) 9/21 (R) (section 109)	3	2	Looking at Data-Relationships	AL
Week 4 9/26 (T) (section 103) 9/28 (R) (section 109)	4	4	Probability: The study of Randomness	AL
Week 5 10/3 (T) (section 103) 10/5(R) (section 109)	5	4 5	Probability: The study of Randomness Sampling Distributions	AL
Week 6 10/10(T) (section 103) 10/12(R) (section 109)	6	5	Sampling Distributions	AL
Week 7 10/17(T) (section 103) 10/19(R) (section 109)	7	5	Sampling Distributions Review for Exam	AL
Week 8 10/24 (T) (section 103) 10/26(R) (section 109)	8	6	**MIDTERM EXAM** Introduction to Inference	
Week 9 10/31(T) (section 103) 11/2(R) (section 109)	9	6 7	Introduction to Inference Inference for Means	AL
Week 10 11/07(T) (section 103) 11/10(R) (section 109)	10	6 7	Introduction to Inference Inference for Means	AL
(WITHDRAWAL DEADLINE MONDAY, NOVEMBER 13, 2023)				
Week 11 11/14(T) (section 103) 11/16(R) (section 109)	11	6 8	Introduction to Inference Inference for Proportions	AL

Thursday classes meet on Tuesday (section 103 does not meet on 11/21) 11/21(T) 11/21 (section 109)	**12**	**7** **9**	Inference for Means Inference for Categorical data	AL
(THANKSGIVING RECESS: NOVEMBER 23 - 26, 2023)				
Week 12 11/28(T) (section 103) 11/30 (R) (section 109)	**12** **13**	**7** **9** **12**	Inference for Means Inference for Categorical data One-Way Analysis of Variance	AL AL
Week 13 12/05(T) (section 103) 12/07 (R) (section 109)	**13** **14**	**12**	One-Way Analysis of Variance Review for Final Exam	AL
Week 14 12/12(T) (section 103)	**14**		Review for Final Exam	
			Reading Day 12/14 and 12/15 (R & F)	
12/17 - 12/23 (section 103 and section 109)			**FINAL EXAM WEEK**	