

Math 478: Statistical Methods in Data Science *Spring 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: This course introduces to students concepts in statistical methods used in data science, including data collection, data visualization and data analysis. Emphasis is on model building and statistical concepts related to data analysis methods. The course provides the basic foundational tools on which to pursue statistics, data analysis and data science in greater depth. Topics include sampling and experimental design, understanding the aims of a study, principles of data analysis, linear and logistic regression, resampling methods, and statistical learning methods. Students will use the R statistical software.

Number of Credits: 3

Prerequisites: **Math 333** with a grade of C or better or **Math 341** with a grade of C or better.

Course-Section and Instructors:

Course-Section	Instructor
Math 478-002	Professor W. Guo

Office Hours for All Math Instructors: [Spring 2023 Office Hours and Emails](#)

Required Textbook:

Title	<i>The Elements of Statistical Learning</i>
Author	Trevor Hastie; Robert Tibshirani; Jerome Friedman
Edition	2nd
Publisher	Springer
ISBN #	978-0387848570

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, April 3, 2023**. It will be strictly enforced.

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	15%
Midterm Exam I	25%
Midterm Exam II	25%
Final Exam	35%

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

A	90 - 100	D	60 - 70
B	80 - 90	F	0 - 60
C	70 - 80		

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.

Cheating in Exams: Once caught, the exam will be assigned zero points. To prevent cheating, please leave at least one seat empty between you and your neighbors.

Exams: There will be two in-class midterm exams during the semester and one comprehensive in-class final exam. Exams are held on the following days:

Midterm Exam 1	Feb. 16, 2023
Midterm Exam 2	Mar. 23, 2023
Final Exam Period	May 5 - May 11, 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 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.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: [Spring 2023 Hours](#))

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 contact Scott Janz, Associate Director of Disability Support Services at [973-596-5417](tel:973-596-5417) or via email at 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/>

Important Dates (See: [Spring 2023 Academic Calendar, Registrar](#))

Date	Day	Event
January 17, 2023	Tuesday	First Day of Classes
January 23, 2023	Monday	Last Day to Add/Drop Classes
March 13, 2023	Monday	Spring Recess Begins
March 18, 2023	Saturday	Spring Recess Ends
April 3, 2023	Monday	Last Day to Withdraw
April 7, 2023	Friday	Good Friday - No Classes
May 2, 2023	Tuesday	Friday Classes Meet
May 2, 2023	Tuesday	Last Day of Classes
May 3 - May 4, 2023	Wednesday and Thursday	Reading Days
May 5 - May 11, 2023	Friday to Thursday	Final Exam Period

Course Outlines

Weeks	Chapters	Topics	Assignments
Week 1 (1/16)	Chapter 1	Introduction to Data Science	
Week 2 (1/23)	Chapter 2	Statistical Learning; kNN	Homework 1
Week 3 (1/30)	Chapter 3	Linear Regression	
Week 4 (2/6)	Chapter 4	Logistic Regression	Homework 2
Week 5 (2/13)	Chapter 4	LDA; QDA REVIEW FOR EXAM #1 Midterm Exam 1: Thursday ~ Feb. 16, 2023	
Week 6 (2/20)	Chapter 5	Cross-Validation and Bootstrap	
Week 7 (2/27)	Chapter 6	Linear Model Selection	Homework 3
Week 8 (3/6)	Chapter 6	Shrinkage Methods and Dimension Reduction Methods	
Week 9 (3/20)	Chapter 7	Nonlinear Modeling	Homework 4
Week 10 (3/27)	Chapter 8	Tree-Based Methods REVIEW FOR EXAM #2 Midterm Exam 2: Thursday ~ Mar. 23, 2023	
Week 11 (4/3)	Chapter 8	Bagging, Random Forests, Boosting	
Week 12 (4/10)	Chapter 9	Support Vector Machines	Homework 5
Week 13 (4/17)	Chapter 12	Unsupervised Learning	
Week 14 (4/24)	Chapter 12	Unsupervised Learning (Cont.)	Homework 6
Week 15 (5/1)	Chapter 13	Multiple Testing (If time permits) REVIEW FOR FINAL EXAM Thursday ~ Reading Day 2	

Week 16 (5/8)		FINAL EXAM: Monday ~ May 8, 2023	
-------------------------	--	--	--

Updated by Professor W. Guo - 1/6/2023
Department of Mathematical Sciences Course Syllabus, Spring 2023