

Spring 2024

## **MATH 478-002: Stat Methods in Data Sci**

W. Guo

Follow this and additional works at: <https://digitalcommons.njit.edu/math-syllabi>

---

### **Recommended Citation**

Guo, W., "MATH 478-002: Stat Methods in Data Sci" (2024). *Mathematical Sciences Syllabi*. 329.  
<https://digitalcommons.njit.edu/math-syllabi/329>

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Mathematical Sciences Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact [digitalcommons@njit.edu](mailto:digitalcommons@njit.edu).

## Math 478: Statistical Methods in Data Science *Spring 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:** 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 2024 Office Hours and Emails](#)

**Required Textbook:**

Title	<i>An Introduction to Statistical Learning: with Applications in R</i>
Author	Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani
Edition	2nd ed. 2021 edition
Publisher	Springer
ISBN #	978-1071614174

**University-wide Withdrawal Date:** The last day to withdraw with a W is **Monday, April 1, 2024**. 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	30%
Midterm Exam	30%
Final Exam	40%

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	March 7, 2024
Final Exam Period	May 3 - May 9, 2024

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 2024 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 If you need an accommodation due to a disability please contact the Office of Accessibility Resources and Services at [oars@njit.edu](mailto: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 2024 Academic Calendar, Registrar](#))

Date	Day	Event
January 16, 2024	Tuesday	First Day of Classes
January 22, 2024	Monday	Last Day to Add/Drop Classes
March 10, 2024	Sunday	Spring Recess Begins
March 16, 2024	Saturday	Spring Recess Ends
March 29, 2024	Friday	Good Friday - No Classes
April 1, 2024	Monday	Last Day to Withdraw
April 30, 2024	Tuesday	Friday Classes Meet
April 30, 2024	Tuesday	Last Day of Classes
May 1, 2024	Wednesday	Reading Day 1
May 2, 2024	Thursday	Reading Day 2
May 3 - May 9, 2024	Friday to Thursday	Final Exam Period

## Course Outlines

Weeks	Chapters	Topics	Assignments
<b>Week 1</b> (1/18)	Chapter 1	Introduction to Data Science	
<b>Week 2</b> (1/22)	Chapter 2	Statistical Learning; kNN	Homework 1
<b>Week 3</b> (1/29)	Chapter 3	Linear Regression	
<b>Week 4</b> (2/5)	Chapter 4	Logistic Regression	Homework 2
<b>Week 5</b> (2/12)	Chapter 4	LDA; QDA; Naive Bayes; Generalized Linear Models	
<b>Week 6</b> (2/19)	Chapter 5	Cross-Validation and Bootstrap	
<b>Week 7</b> (2/26)	Chapter 6	Linear Model Selection	Homework 3
<b>Week 8</b> (3/4)	Chapter 6	Shrinkage Methods and Dimension Reduction Methods Review for Midterm Exam  <b>Midterm Exam:</b> Thursday ~ Mar. 7, 2023	
<b>Week 9</b> (3/18)	Chapter 7	Nonlinear Modeling	Homework 4
<b>Week 10</b> (3/25)	Chapter 8	Tree-Based Methods	
<b>Week 11</b> (4/1)	Chapter 8	Bagging, Random Forests, Boosting	
<b>Week 12</b> (4/8)	Chapter 9	Support Vector Machines	Homework 5
<b>Week 13</b> (4/15)	Chapter 12	Unsupervised Learning	
<b>Week 14</b> (4/22)	Chapter 12	Unsupervised Learning (Cont.)	Homework 6
<b>Week 15</b> (4/29)	Chapter 10	Deep Learning (If time permits) REVIEW FOR FINAL EXAM  <b>Thursday ~ Reading Day 2</b>	
<b>Week 16</b> (5/6)		<b>FINAL EXAM:</b>	

		Monday ~ May 6, 2024	
--	--	----------------------	--

*Updated by Professor W. Guo - 12/19/2023*  
*Department of Mathematical Sciences Course Syllabus, Spring 2024*