

Fall 2019

# MATH 644-101: Regression Analysis Methods

W. Guo

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THE DEPARTMENT OF MATHEMATICAL SCIENCES

## MATH 644: Regression Analysis Methods

### *Fall 2019 Graduate 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:** Regression models and the least squares criterion. Simple and multiple linear regression. Regression diagnostics. Confidence intervals and tests of parameters, regression and analysis of variance. Variable selection and model building. Dummy variables and transformations, growth models. Other regression models such as logistic regression. Using statistical software for regression analysis.

**Number of Credits:** 3

**Prerequisites:** Math 661.

**Course-Section and Instructors**

Course-Section	Instructor
Math 644-101	Professor W. Guo

**Office Hours for All Math Instructors:** [Fall 2019 Office Hours and Emails](#)

**Required Textbooks:**

Title	<i>Applied Linear Regression</i>
Author	Weisberg
Edition	4th
Publisher	Wiley
ISBN #	978-1118386088

**University-wide Withdrawal Date:** The last day to withdraw with a W is **Monday, November 11, 2019**. 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:

Homework	25%
Project	15%
Midterm Exam	25%
Final Exam	35%

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

A	90 - 100	C	70 - 75
B+	85 - 89	F	0 - 70
B	80 - 85		
C+	75 - 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.

**Homework Policy:** Homework problems will be assigned in class.

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

Midterm Exam I	October 28, 2019
Final Exam	December 14 - 20, 2019

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:** To properly report your absence from a midterm or final exam, please review and follow the required steps under the DMS Examination Policy found here:

- [http://math.njit.edu/students/policies\\_exam.php](http://math.njit.edu/students/policies_exam.php)

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

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## ADDITIONAL RESOURCES

**Accommodation of Disabilities:** Disability Support Services (DSS) 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 Chantonette Lyles, Associate Director of Disability Support Services at **973-596-5417** or via email at [lyles@njit.edu](mailto:lyles@njit.edu). The office is located in Fenster Hall, Room 260. A Letter of Accommodation Eligibility from the Disability Support 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 Disability Support Services (DSS) website at:

- <https://www.njit.edu/studentsuccess/accessibility/>

**Important Dates** (See: **Fall 2019 Academic Calendar, Registrar**)

Date	Day	Event
September 3, 2019	T	First Day of Classes
September 13, 2019	F	Last Day to Add/Drop Classes
November 11, 2019	M	Last Day to Withdraw
November 26, 2019	T	Thursday Classes Meet
November 27, 2019	W	Friday Classes Meet
November 28-29, 2019	R-F	Thanksgiving Recess
December 11, 2019	W	Last Day of Classes
December 12, 13 2019	R & F	Reading Days
December 14-20, 2019	F - R	Final Exam Period

## Course Outline

Date	Lecture	Chapter	Topic	Assignment
<b>WEEK 1</b> 9/9	1	Chapter 1	Scatterplots and Regression: scatterplots, mean functions, variance functions, scatterplot matrices.	
<b>WEEK 2</b> 9/16	2	Chapter 2	Simple Linear Regression: least square estimates, analysis of variance, coefficient of determination, confidence intervals and tests.	Homework 1
<b>WEEK 3</b> 9/23	3	Chapter 3	Multiple Regression: least square estimates, analysis of variance, prediction and fitted values.	
<b>WEEK 4</b> 9/30	4	Chapter 4	Interpretation of Main Effects: understanding parameter estimates, more on R squared, dropping regressors.	Homework 2
<b>WEEK 5</b> 10/7	5	Chapter 5	Complex Regressors: factors, many factors, polynomial regression, splines, principal components, missing data.	
<b>WEEK 6</b> 10/14	6	Chapter 6	Testing and Analysis of Variance: analysis of variance, comparisons of means, Wald test, interpreting tests.	Homework 3
<b>WEEK 7</b> 10/21	7	Chapter 7	Variances: weighted least squares, mis-specified variances, mixed models, delta method, bootstrap.	
<b>WEEK 8</b> 10/28			MIDTERM EXAM: Monday - October 28, 2019	
<b>WEEK 9</b> 11/4	8	Chapter 8	Transformations: power transformations, Box-Cox method, general transformation methods, additive models.	Regression Analysis Project Homework 4
<b>WEEK 10</b> 11/11	9	Chapter 9	Regression Diagnosis: residuals, curvature, non-constant variance, outliers, influence of cases, normality assumption.	

<b>WEEK 11 11/18</b>	10	Chapter 10	Variable Selection: stepwise regression, regularized methods, cross-validation.	Homework 5
<b>WEEK 12 11/25</b>	11	Chapter 11	Nonlinear Regression: estimation and inference for nonlinear mean functions.	
<b>WEEK 13 12/2</b>	12	Chapter 12	Binomial and Poisson Regression: Logistic regression, Poisson regression, generalized linear models.	Homework 6
<b>WEEK 14 12/9</b>			Students' Project Presentation	
<b>WEEK 15 12/16</b>			FINAL EXAM: Monday ~ December 16, 2019	

*Updated by Professor W. Guo - 8/16/2019*  
*Department of Mathematical Sciences Course Syllabus, Fall 2019*

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