

MATH 644: Regression Analysis Methods

Fall 2020 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 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 644-101	Professor A. Wang

Office Hours for All Math Instructors: [Fall 2020 Office Hours and Emails](#)

Required Textbooks:

Title	<i>Applied Linear Regression Models</i>
Author	Kutner, Nachtsheim, and Neter
Edition	4th
Publisher	McGraw-Hill
ISBN #	0-072386916

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, November 9, 2020**. It will be strictly enforced.

COURSE GOALS

Course Objectives: This course explores the mathematical structure, statistical analysis, and practical implementation of the general linear regression model. (Computer implementation is required; instruction in R

is provided but students can use software of their choice.)

Course Outcomes: After completing this course students will be able to -

- Describe the mathematical structure of the linear regression model.
- Describe and demonstrate estimation of model parameters, testing hypotheses about model parameters, and making predictions about new observations from the model.
- Describe and demonstrate model assessment, including residual diagnostics and remedial measures.
- Conduct regression model building for a specified problem.

Course Assessment: Assessment of objectives is achieved through homework assignments and two examinations: a midterm exam and a comprehensive final exam.

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 and Quizzes	20%
Midterm Exam	25% each
Final Exam	30%

The final grade will be based on the following grading scale:

A	90 - 100	C	68 - 74
B+	85 - 89	D	50 - 67
B	80 - 84	F	0 - 49
C+	75 - 79		

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.

Assistance: For further questions, students should contact their Instructor. All Instructors have regular office hours during the week. These office hours are listed at the link above by clicking on the Instructor's name. Teaching Assistants are also available in the math learning center.

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

Midterm Exam	Week 7
Final Exam	December 15 - 21, 2020

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

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

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. The office is located in Kupfrian Hall, Room 201. 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/studentssuccess/accessibility/>

Important Dates (See: [Fall 2020 Academic Calendar](#), [Registrar](#))

Date	Day	Event
September 1, 2020	T	First Day of Classes
September 5, 2020	S	Saturday Classes Begin
September 7, 2020	M	Labor Day
September 8, 2020	T	Monday Classes Meet
September 8, 2020	T	Last Day to Add/Drop Classes
November 9, 2020	M	Last Day to Withdraw
November 25, 2020	W	Friday Classes Meet
November 26-29, 2020	R - Su	Thanksgiving Recess - University Closed
December 10, 2020	R	Last Day of Classes
December 11 & 14, 2020	F & M	Reading Days
December 15 - 21, 2020	T - M	Final Exam Period

Course Outline

Week	Lecture	Chapter	Topic
Week 1 9/14	1	1	Simple Linear Regression Model with distribution of error terms unspecified, Normal Error Regression Model
Week 2 9/21	2	2	Inferences Concerning Regression Parameters Interval Estimation of mean response Prediction of New Observation
Week 3 9/28	3	2	Analysis of Variance Approach to Regression General Linear Test Approach Descriptive Measures of Linear Association
Week 4 10/05	4	3	Diagnostics for Predictor Variable, Residuals Overview of Tests Involving Residuals Test for Constancy of Error Variance, F Test for Lack of Fit Overview of Remedial

			Measures, Box-Cox Transformations
Week 5 10/12	5	4	Joint Estimation for Regression Parameters Simultaneous Estimation of Mean Responses Simultaneous Prediction Intervals for New Observations
Week 6, 7 10/19, 10/26	6 - 7		REVIEW FOR MIDTERM EXAM MIDTERM EXAM: WEDNESDAY~ OCT 26, 2020
Week 8 11/02	8	4	Regression through Origin Effects of Measurement Errors Inverse Predictions
Week 9 11/09	9	5	Matrices and their Properties Simple Linear Regression Model in Matrix Terms Least Squares Estimation of Regression Parameters
Week 10 11/16	10	5	Fitted Values and Residuals Analysis of Variance Results Inferences in Regression Analysis
Week 11 11/23	11	6	Multiple Regression Models General Linear Model in Matrix Terms Estimation of Regression Coefficients
Week 12 11/30	12	9	Overview of Model Building Process
Week 13 12/07	13		Final Review

Updated by Professor A. Wang - 8/25/2020
Department of Mathematical Sciences Course Syllabus, Fall 2020
