NJIT New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 644-852: Regression Analysis Methods
Spring 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 661.

Course-Section and Instructors

Course-Section	Instructor
Math 644-852	Professor A. Pole

Office Hours for All Math Instructors: Spring 2020 Office Hours and Emails

Required Textbooks:

Title	*Applied Linear Regression Models*
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, April 6, 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 Assignments	30%
Midterm Exam	35%
Final Exam	35%

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.

Using Respondus LockDown Browser and a Webcam for Online Exams

Respondus LockDown Browser is a locked browser for taking assessments or quizzes in Canvas. It prevents you from printing, copying, going to another URL, or accessing other applications during a quiz. If a Canvas quiz requires that LockDown Browser be used, you will not be able to take the assessment or quiz with a standard web browser. You may be required to use LockDown Browser with a webcam (Respondus Monitor), which will record you during an online exam.

This course requires the use of Respondus LockDown Browser and/or Respondus Monitor with a webcam for online exams. The webcam can be built into your computer or can be the type that plugs in with a USB cable. Watch this short video to get a basic understanding of LockDown Browser and the webcam feature. A student Quick Start Guide (PDF) is also available.

1. Download and install LockDown Browser from this link:
http://www.respondus.com/lockdown/download.php?id=264548414

2. Once your download has finished, locate the "LockDown Browser" shortcut on the desktop and double-click it. (For Mac users, launch "LockDown Browser" from the Applications folder.)

3. You will be brought to the Canvas login page within the LockDown Browser, click "Login with your UCID" to log in with your NJIT UCID and password and then click Login.

4. Under "My courses", click on the course in which you have to take the exam that requires the LockDown Browser.

5. After you enter the course, find the exam and click on it.

6. A confirmation prompt will appear, click the “Start attempt” button. Once a quiz has been started with LockDown Browser, you cannot exit until the Submit all and finish button is clicked.

7. If you are required to use a webcam (Respondus Monitor), you will be prompted to complete a Webcam Check and other Startup Sequence steps.

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 I	Week 7
Final Exam	May 8 - 14, 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/studentsuccess/accessibility/

Important Dates (See: Spring 2020 Academic Calendar, Registrar)

Date	Day	Event
January 21, 2020	T	First Day of Classes
January 31, 2020	F	Last Day to Add/Drop Classes
March 15 - 22, 2020	Su-Su	Spring Recess: No Classes/ University Open
April 6, 2020	M	Last Day to Withdraw
April 10, 2020	F	Good Friday - University Closed
May 5, 2020	T	Friday Classes Meet - Last Day of Classes
May 6 & 7, 2020	W & R	Reading Days
May 8 - 14, 2020	F - R	Final Exam Period

Course Outline

Topics
WEEK 1 Chapter 1. Simple linear regression model with distribution of error terms unspecified. Normal error regression model.
WEEK 2 Chapter 2. Inferences concerning regression parameters. Interval estimation of mean response. Prediction of new observation.
WEEK 3 Chapter 2. Analysis of variance approach to regression. General linear test approach.
WEEK 4 Chapter 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 Chapter 4. Joint estimation for regression parameters. Simultaneous estimation of mean responses. Simultaneous prediction intervals for new observations.
WEEK 6 Chapter 4. Regression through the origin. Effects of measurement errors. Inverse predictions.
WEEK 7 ***MIDTERM EXAM***
WEEK 8 Chapter 5. Simple linear regression model in matrix terms. Least squares estimation of regression parameters.
WEEK 9 Chapter 5. Fitted values and residuals. Analysis of variance results. Inferences in regression analysis
WEEK 10 Chapter 6. Multiple regression models. General linear model in matrix terms. Estimation of regression coefficients.
WEEK 11 Chapter 6. Fitted values and residuals. Analysis of variance. Inferences about parameters.
WEEK 12 Chapter 7. Extra sums of squares. Tests concerning regression coefficients. Multicollinearity.
WEEK 13 Chapter 9. Overview of model building process

WEEK 14 Topics...
WEEK 15 ***FINAL EXAM***

Updated by Professor A. Pole - 1/20/2020
Department of Mathematical Sciences Course Syllabus, Spring 2020