MATH 644: Regression Analysis Methods
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: 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 2024 Office Hours and Emails

Required Textbook:

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

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 1, 2024**. 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:

Assignments	30%
Discussion Forums	10%
Midterm Exam	30%
Final Exam	30%

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.

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 exam during the semester and a cumulative final exam during the final exam week:

Midterm Exam	
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 QUIZZES OR 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

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. 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 Outline

Week	Subject Topic
1	*Chapter 1. Simple linear regression model with distribution of error terms unspecified. Normal error regression model.*
2	*Chapter 2. Inferences concerning regression parameters. Interval estimation of mean response. Prediction of new observation.*
3	*Chapter 2. Analysis of variance approach to regression. General linear test approach.*
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.*
5	*Chapter 4. Joint estimation for regression parameters. Simultaneous estimation of mean responses. Simultaneous prediction intervals for new observations.*
6	*Chapter 4. Regression through the origin. Effects of measurement errors. Inverse predictions.*

7	*MID TERM EXAM*
8	*Chapter 5. Simple linear regression model in matrix terms. Least squares estimation of regression parameters.*
9	*SPRING BREAK*
10	*Class #9* *Chapter 5. Fitted values and residuals. Analysis of variance results. Inferences in regression analysis*
11	*Class #10* *Chapter 6. Multiple regression models. General linear model in matrix terms. Estimation of regression coefficients.*
12	*Class #11* *Chapter 6. Fitted values and residuals. Analysis of variance. Inferences about parameters.*
13	*Class #12* *Chapter 7. Extra sums of squares. Tests concerning regression coefficients. Multicollinearity.*
14	*Class #13* *Chapter 9. Overview of model building process*
15	*Class #14* *Topics...polynomial regression … Poisson regression*
16	*FINAL EXAM*

Updated by Professor A. Pole - 01/3/2024
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