GENERAL INFORMATION

Course Title: Regression Analysis, MATH 3010

Field: Mathematics

Credit Weight: 3

Semester and Year: Fall 2023

Pre-requisites: STAT 1100 Introduction to Statistics; MATH 2025 Introduction to Linear Algebra

Course Description

Regression Analysis estimates relationships between independent variables and a dependent variable. This course is intended to introduce the basic ideals and models of regression analysis, including its interpretation and implementation in the statistical software package. Topics of simple linear regression, multiple linear regression, least-squares estimation, hypothesis testing, transformations, generalized and weighted least squares, multicollinearity, variable selection and model building, nonlinear regression model will be included.

Learning Objectives

By the end of this course, students will be able to do the following:

- Understand the concept of simple and multiple linear regression model and properties of model parameters
- Give an account of the principle of least squares, and carry out tests of linear hypothesis
- Validate the modeling assumptions with formal tests and visual diagnostic tools
- Use regression models to understand and explain relationships among variables
- Utilize statistical software such as SAS procedures in computation and analysis

Required Text/Readings:

Elizabeth Peck, Geoffrey Vining, Douglas Montgomery, ***Introduction to Linear Regression Analysis***, Wiley series in probability and statistics, Year: 2012.

Accessibility Services (Accommodations)

Students with documented academic, medical, emotional, and/or physical disabilities, who require accommodation, must provide current documentation attesting to the specific nature of their disability to Carolyn Draht, Academic Accommodations Coordinator and Associate Registrar, at accommodations@elmira.eduor in McGraw Hall room 113. Students are responsible for submitting the appropriate documents and forms in a timely manner. A meeting to review documentation and discuss accommodations is strongly recommended. If you have questions concerning this, please contact me or Carolyn Draht directly.

Academic Honesty

Please read the relevant section of the College's policy on academic honesty in the student Code of Conduct. Briefly academic dishonesty includes: cheating, fabrication, and plagiarism. Please ask me if you have any questions about whether something constitutes academic dishonesty. Academic dishonesty will not be tolerated and will result in failure of the course. Institutional penalties may also apply.

Attendance Policy & Class Participation

You are expected to complete all assignments and exams on time, attend class regularly, and come to class prepared to participate actively. Please have readily available the assigned readings and texts. They will be a valuable resource for our discussions and will assist you in following lectures.

Evaluation of Performance

Final grades will be determined as follow:

Participation	5%
4 Homework	20%
2 Projects	20%
Final Essay	15%
2 Exams	40%
Total	100%

Grades will be assigned as follows:

Grade		Grade	
A	(93- 100%)	C	(73-76%)
A-	(90-92%)	C-	(70-72%)
B+	(87-89%)	D+	(67-69%)
B	(83-86%)	D	(64-66%)
B-	(80-82%)	D-	(60-63%)
C+	(77-79%)	F	(<60%)

Content

Module Topics	**Materials**	**Tasks**
Introduction: Regression and Model Building; Uses of Regression; Role of the Computer Simple Linear Regression Model Least-Squares Estimation of the Parameters Hypothesis Testing on the Slope and Intercept Multiple Linear Regression Model Properties of the Least-Squares Estimators Hypothesis Testing in Multiple Linear Regression	Chapter 1-3	Homework 1
PRESS Statistic Lack of Fit of the Regression Model Transformations and Weighting to Correct Model Inadequacies Transformations to Linearize the Model Generalized and Weighted Least Squares	Chapter 4-6	Homework 2 Project 1

Diagnostics for Leverage and Influence		
Polynomial Regression Models Indicator Variables Multicollinearity Multicollinearity Diagnostics Variable Selection and Model Building Computational Techniques Strategy and for Variable Selection	Chapter 7-10	Exam 1 Homework 3
Validation of Regression Model Introduction Nonlinear Regression Models Transformation to a Linear Model Statistical Inference in Nonlinear Regression Using SAS and R Generalized Linear Model	Chapter 11-12	Homework 4 Project 2
Regression Analysis of Time Series Data Other Topics in the Use of Regression Analysis Designed Experiments for Regression	Chapter 13-15	Final Essay Exam 2

This syllabus is subject to change. Keep aware of the changes that might occur. There will be announcement if that happens.