

Salisbury University Department of Mathematical Sciences

MATH 314 : Regression Analysis
Syllabus (Tentative)

Description: The study of relationships among variables. Correlation, simple linear regression and multiple regression analyses are studied. Other topics such as Ridge regression and logistic regression also are considered. Computer software such as Minitab and SPSS is used. 4 Hours Credit: Meets four hours per week. Meets General Education IVB or IVC.

Prerequisites: C or better in MATH 151 or MATH 155 or MATH 213 or MATH 216.

Intended Audience: Students who need a more advanced course in applied statistics in order to apply statistical methods to their own data and to interpret results of others.

Objective: To study relationships between variables and to build appropriate models of these relationships through regression analysis.

Textbooks: *Introduction to Linear Regression Analysis*, 6th Edition, by Douglas C. Montgomery, Elizabeth A. Peck, and G. Geoffrey Vining.

Technology: Common statistical packages such as R/RStudio will be used for all analyses.

Topic	Weeks
Introduction to Regression Models - Chapter 1	0.5
Introduction about the concepts and idea of regression models.	
Simple Linear Regression - Chapter 2	2
Study the mathematical model of simple linear regression, including the idea of least-squares estimation, hypothesis testing, interval estimations, predictions, and applications.	
Matrix Algebra - Preview/Review	0.5
Preview/review the concept and calculation of matrix algebra and the R implementation.	
Multiple Linear Regression Model - Chapter 3	2
Study the mathematical model of multiple linear regression, including the idea of least-squares estimation, hypothesis testing, interval estimations, predictions, and applications.	
Specification Issues - Chapters 7, 8	1
Discuss polynomial regression models, indicator variables, and regression approach to ANOVA.	
Model Checking - Chapter 4, 6, 9	2
Study the model checking analysis, including residual analysis, outliers, leverage and influence points, multicollinearity, and lack of fit test.	
Model Selection - Chapter 10	1
Discuss techniques for variable selection and model building.	
Non-Linear Regression - Chapter 12	1
Introduction to nonlinear regression, transformations, statistical inferences, and examples.	
Generalized Linear Models - Chapter 13	2
Study the generalized linear models, including logistic regression models, Poisson regression models, and GLM in general.	
Project	1
Tests	1
Total	14

Evaluation

Project	25%
Homework and quizzes	15%
Tests	35%
Final examination	25%

- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.
- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**
- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.