

SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Mathematics
Title of Course: Applied Regression Analysis

Course Number: MA425/625
Date: January 2011

I. Catalog Description:

Learn how to use regression to represent a relationship between explanatory variables and their associated response. Emphasis will be on analyzing actual datasets. The following topics will be covered: simple linear regression, multiple regression, prediction, variable selection, residual diagnostics, auto-regression, and logistic regression. (3)

II. Prerequisites: MA223 Elementary Probability & Statistics

III. Objectives of Course:

To provide a basic knowledge of the purposes, methods and applications of regression. To develop the ability to apply these concepts correctly using statistical software such as R.

IV. Expectations of Students:

- A. The goal in this course is to give students some experience with basic regression techniques that can be applied to real world problem in their chosen field.
- B. Attend class and actively participate in classroom activities and discussions.
- C. Collect data as assigned and complete assigned homework.
- D. Read assigned literature, including the text.
- E. Complete group and individual projects and present them to the instructor.
- F. Perform adequately on exams.

V. Course Outline:

1. SIMPLE LINEAR REGRESSION (15 hours)
 - i. Model description and assumptions
 - ii. Estimation of regression functions
 - iii. Inference about the slope and the intercept
 - iv. Confidence and prediction intervals
 - v. Partitioning of variability and lack of fit
 - vi. Residual analysis and transformation
2. MULTIPLE LINEAR REGRESSION (15 hours)
 - i. Model description and assumptions
 - ii. Regression model in matrix form
 - iii. Estimation of regression functions
 - iv. Inference about regressor parameters
 - v. Confidence and prediction intervals
 - vi. Multicollinearity and its effects
 - vii. Variable selection and diagnostics
3. NONLINEAR REGRESSION (13 hours)
 - i. Time series - auto-regression
 - ii. Classification - logistic regression

4. EXAMS (2 hours)

Total Class Hours: 45

I. Textbook: One of the following

- i. Neter, Kutner, Nachtsheim, and Wasserman. *Applied Linear Regression Models* 4th Edition. McGraw-Hill/Irwin; 2003.
- ii. Sheather, Simon J. *A Modern Approach to Regression with R*. Springer; 2009.
- iii. Montgomery, Peck, and. Vining. *Introduction to Linear Regression Analysis*. Wiley-Interscience; 2007.

II. Statistical Software: R, SAS and SPSS

III. Basis of Student Evaluation

- i. Assignments 30%

- ii. Hourly Exams 40%
- iii. Final Exam 30%

VIII. Grading Scale

90% - 100% = A

80% - 89% = B

70% - 79% = C

0% - 69% = F

The weight of the evaluation criteria may vary according to each instructor and will be communicated at the beginning of the course.

IX. Academic Policy Statement:

Students will be expected to abide by the University Policy for Academic Honesty regarding plagiarism and academic honesty. Refer to:

<http://www6.semo.edu/judaffairs/code.html>

X. Student with Disabilities Statement:

If a student has a special need addressed by the Americans with Disabilities Act (ADA) and requires materials in an alternative format, please notify the instructor at the beginning of the course. Reasonable efforts will be made to accommodate special needs.