A one semester introductory course in regression analysis. It covers the basic ideas of Applied Regression Analysis including: Simple Linear Regression; Residual Analysis; Multiple Regression; Parameter Estimation and Testing; Indicator Variables; Diagnostics; Model Selection Procedures; Logistic regression. The course will cover the material in chapters 1-10, parts of chapters 11, 12 and 14 of the textbook. Any changes will be announced in class.

PREREQUISITES
Knowledge of the basic concepts of probability and statistics (Stat 51, 53, or 111 and 157, 158).

TEXTS
A good freely downloadable reference book is [Practical Regression and Anova in R](#) by Faraway.

COURSE STRUCTURE:
The class consists of a lecture followed by one lab per week. Your grade is based on homework, projects and two exams.

LEARNING OUTCOMES:
As a result of completing this course, students will:
1. learn basic methods required for data analysis and interpretation
2. understand basic concepts of correlation, regression, model diagnostics and model building
3. learn how to fit and interpret regression models and apply them in various fields (e.g. Finance, Economics)
4. analyze and interpret regression data using statistical software
5. compare different competing regression models and select the best
6. draw conclusions and communicate analysis results

GRADING
- homework and quizzes 30%
- computer projects 20%
- exams 25% each

- **HOMEWORK:** Homework will be assigned almost every week. The majority of the homeworks will be collected and graded. All students must work independently on the homework sets. HW will be collected on the due date before the lecture starts. Late submission will not be accepted. Your TA will go over problems similar to the HW problems and software examples during lab sessions.

- **DATA ANALYSIS PROJECTS:** There will be at least two (one individual and one group) computer projects involving the use of a statistical software to analyze data. A report along with the code and output will be turned in.

- **EXAMS:** Two closed book examinations will be given. If an exam is missed, you will receive zero credit for that part of the grade. **No make-up exams will be given.** In exceptional circumstances (e.g. well-documented medical problems), a missed exam will not be counted.

A grade of INCOMPLETE will ONLY be given to a student who is passing the course and cannot complete the course due to illness or other (well documented) circumstances beyond their control.

**EXAM DATES:**

Exam 1: February 23
Exam 2: April 26

**COURSE OUTLINE**

- Review of the basic concepts from probability and statistics,
- Introduction to Linear Models: Simple Linear Regression Examples, Assumptions for Linear Models, Ordinary Least Squares (OLS) estimators, $R^2$, Residuals
- Inference in Linear Regression: inference for the slope and the intercept, interpretation of results, prediction, F-tests
Regression Diagnostics: outliers, influential points, graphical diagnostics, remedies, weighted least squares

Matrix Algebra

Regression in matrix notation, multiple regression: estimation, prediction, diagnostics, nested models, multi-collinearity, ridge regression, qualitative predictors, mixture of continuous and categorical variables, model building/selection and model validation,

Regression models with binary response, simple and multiple logistic regression, inference goodness of fit tests, diagnostics

Statistical Packages: You will need to use a statistical package in order to perform most of the statistical analyses covered in this course. We will use both SAS and R. A brief introduction to the SAS package can be found at http://www.umass.edu/statdata/software/handouts/sas_online/


A list of books using R is given at http://www.r-project.org/doc/bib/R-publications.html The R Manuals can be found by clicking here http://www.r-project.org/ and selecting Manuals under Documentation on the left column.

ACADEMIC INTEGRITY

I personally support the GW Code of Academic Integrity. It states: “Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information.” For the remainder of the code, see: http://www.gwu.edu/~ntegrity/code.html

SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM

DISABILITY SUPPORT SERVICES (DSS)
Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: http://gwired.gwu.edu/dss/

UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:

- crisis and emergency mental health consultations
- confidential assessment, counseling services (individual and small group), and referrals

http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices
SECURITY
In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.

BLACKBOARD REGISTRATION: Course information and materials, including notes, grades, and details about course assignments and exams will be posted in Blackboard periodically. It is the student’s responsibility to check the Stat 118 Blackboard website frequently for up-to-date information about assignments. Once enrolled in the course, you should automatically be registered on Blackboard. Log into the course website at: https://blackboard.gwu.edu/webapps/portal/frameset.jsp.