

STATISTICS 656--REGRESSION ANALYSIS 1.1

Section 001--Innovation Hall, Room 137--Tuesday 7:20-10:00 PM

Professor: John J. Miller

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Course Web Site: classweb.gmu.edu/jmiller/s656/s656.htm

Office Hours: By mutually convenient appointment.

Required Text: *Applied Regression Analysis, 3rd Edition*, Draper and Smith.

Suggested supplementary texts:

The Little SAS Book, Delwiche and Slaughter. *This will help those of you who are not familiar with the SAS data step or SAS programming in general.*

Matrix Algebra as a Tool, Hadi. *This book contains a basic introduction to matrices with some helpful advanced parts. It may prove helpful for those who need to improve their knowledge of matrix theory. (This book is out of print, but if you need such a book and can get a copy, you will find it very useful.)*

Course Goal: When you complete this course, you should be able to confidently attack real problems requiring regression methodology. You should understand *why* regression works and *how* to use SAS to obtain regression results. You should be able to take a problem, run the proper analysis and write up a compelling summary of the results. These abilities will greatly help you in many fields of research and employment.

Agenda: We will work through the required text starting at Chapter 1 and going at least to Chapter 16, leaving out some things as we go. See attached detailed syllabus.

Schedule Adjustment: The schedule adjustment period (for dropping courses without academic penalty) expires September 26, 2008 at 5:00 PM.

Grading: There will be homework assignments every week. Some homeworks will be graded. There will be in-class quizzes some weeks. Some quizzes will be announced and others may not be announced in advance. There will be a test on matrix algebra, a midterm and a final exam, all take home. There *will* be an in-class portion for all tests! The matrix test is tentatively scheduled to be given out September 30 and due back October 7. Part 1 of the midterm is tentatively scheduled to be given out October 7 and due back October 21. Part 2 of the midterm is tentatively scheduled to be given out October 21 and due back October 28. Part 1 of the Final Exam will be given out on November 18 and due back on December 2. Part 2 of the Final Exam will be given out on November 25 and due back Tuesday December 9 when you come to take the in-class final exam.

Computer: Many assignments (if not all) will require the use SAS[®] on a computer. You have a wonderful opportunity to have your own copy of SAS. You may obtain a license to use SAS on your own PC for the semester from Patriot Computers (near the Bookstore in Johnson Center). We also have access to SAS on machines in various labs at GMU. (You may also use SAS at your own site, if you wish.) You may wish to purchase the Little SAS Book supplementary text if you are not familiar with SAS. Note: The hardest part about using any computer is learning *editing*. Take the first homework seriously! Learn to do this forthwith!

Typing Homework Solutions: This semester, I would like you to use the “cut and paste” features of a word processor to turn in typed solutions to the homeworks. This is really easier than hand writing the solutions and using physical cutting and pasting. This requirement for typed solutions **does not** apply to the matrix homeworks or test.

Annoyance: During “crunch time”, computers at GMU are not always easily accessible. The way to beat this problem is to either a) Have your OWN copy of SAS. or b) Do assignments at GMU BUT: Do assignments right away. Don't wait until the last minute. Nevertheless, be prepared to occasionally be annoyed and delayed by the computer if you use SAS in the GMU labs.

Iteration: Assignments require iteration. That is, you must make one run, look at the results and then make another run if required. Each assignment may require several runs.

Background: You should understand matrix algebra. Your study will be guided by homeworks. If you need one, get a review text from the library or purchase the Hadi supplementary text. You should have an understanding of applied statistics including the following: hypothesis tests using P-values; confidence intervals; estimation concepts like unbiasedness. You should also have a good understanding of the concepts of expected value, standard error, and variance of random variables. Some knowledge about the normal curve is also helpful.

DVDs: We are going to attempt to videotape each class this semester. You may view DVDs of any of this semester's classes.

Copying My Answers: I will provide you with answers for the homework problems. You can use these as templates for the correct style to use for answers to test questions. However, please do not just copy my answers word for word. (Even if you substitute new names for variables, you are still copying word for word.) Take the *ideas* and *format*, if you like, but use your own words to answer the questions. While it is somewhat flattering to see students use ones own words, it is depressing to a teacher when students don't think about the answers, but just copy them!

Honor Code: The GMU Honor Code applies to all work done in this class. **Using the work of another student, whether that student is taking this class this semester or took it in some previous semester, is a violation of the Honor Code.** Please make sure that you follow the Honor Code. If you have questions or problems, please communicate with me first. You may

communicate with me as much as you want without ever violating the Honor Code and I know almost all the answers for questions in this class!

Tentative Schedule for STAT 656

(Subject to Change at Any Time by Announcement During Class)

Date	Class	Topic	Sects in Text	OUT	DUE IN
8-26	1	Intro, examples, least squares, column game	0.1-0.3,1.0-1.8	demo,mat1	
9-2	2	More least squares, macros, residual analysis, Fiellers Thm, inverses	2.3-2.6,3.0-3.2	hw1,mat2	demo,mat1
9-9	3	Lack of Fit Tests, Influence, Partitioned Matrices, definiteness	2.1-2.2	hw2,mat3	hw1,mat2
9-16	4	Checking and Modeling Heteroscedasticity, the "Codefit" process	13.1-13.6	hw3,mat4	hw2,mat3
9-23	5	Catch up or Move Ahead		hw4,mat5	hw3,mat4
9-30	6	The Matrix Model for Regression	4.1-4.7	matMT	hw4,mat5
10-7	7	In class matrix exam, Models with More than one Independent variable, Suicide Data Example	5.1-5.5,6.1-6.3	MTP1,hw5a,b,c	matMT
10-14		NO CLASS (Fall recess)			
10-21	8	Collinearity, Influence, Modeling with Multiple X's	8.1-8.5,16.1,16.4	MTP2,hw5d,e	MTP1,hw5a,b,c
10-28	9	In class midterm,More on modeling with multiple X's	10.1-10.4	hw6	MTP2,hw5d,e
11-4	10	Catch up or Move Ahead	11.1-11.2,12.1-12.3	hw7a	hw6
11-11	11	Variable Selection Methods	15.0-15.6	hw7b,c	hw7a
11-18	12	Case study (GMU Salary Study)		hw8,FEP1	hw7b,c
11-25	13	Models using dummy variables	14.1-14.3	FEP2	hw8
12-2	14	Analysis of Covariance			FEP1
12-9		In class Final Exam (7:30-10:15, NOTE TIME)			FEP2