PSYCHOLOGY 754
REGRESSION ANALYSIS

When

T R – 10:30-11:45. Innovation 209. Office hours: After class, by appointment or, more likely, whenever I am around, which is usually. 3074 DK. Ph# 993-1347. email: jcortina@gmu.edu

TA – Amanda Anderson. Aander10@gmu.edu Office hours by appt.

Purpose of course

The general purpose of this course, besides torture which, sadly, has been prohibited by APA, is to subject you to all, or at least much, that is regression analysis (How's that for a sentence?). Specifically, we will spend the first half to three quarters of the course covering the nuts and bolts of standard linear regression. This will allow you to address a wide variety of research questions, to identify those questions which are not appropriately addressed with standard regression analysis, and to isolate the problems associated with any given regression analysis.

The second half of the course will be devoted to some of the alternatives to traditional regression analysis such as random coefficient modeling and logistic regression as well as path analysis.

Requirements for the class

There are certain knowledges and skills that I expect you to have coming in to the course. I expect a reasonable understanding of simple (i.e., single independent variable) regression. The course will begin with an overview, but it will go quickly. If you are unfamiliar with regression, this may not be the proper place to get acquainted.

I also expect some degree of facility with computers and data analysis. The projects will involve the manipulation and analysis of various data sets. If you are unfamiliar with SPSS, SAS, and R, **this is not the class for you**. Also, while I don't really care which analysis package you use to do your projects, I will use SPSS. Although I have worked with SAS and R, I am not familiar enough with them to be able to answer specific questions about them. I am also not familiar enough with them to know the types of output that one can get from them. It may be that I will ask you to conduct certain analyses that are possible only in SPSS. Therefore, if at all possible, you should use SPSS.

Required Texts

Cohen, J. Cohen, P, West, S.G., Aiken, L,S. (2003). Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.). Mahwah, NJ: Erlbaum.

Berry, W.D. (1993). Understanding regression assumptions. pp. 13-83. Newbury Park, CA: Sage. (Order it directly from Sage from order@sagepub.com. It is cheaper than going through the bookstore. This is #92 in their Quantitative Applications in the Social Sciences series.)

Format

I talk, you take notes. If that doesn't work, then I suppose we will try something else: field trips, show and tell, something of that nature. Course grades will be based on exams and projects.

Exams

There will be two exams: a midterm, and a final. The final is not cumulative. The exams will be part multiple choice and part short answer. They will also be very difficult, so hold on to your hats. Each exam will be worth 25% of your class grade.

Projects

Over the course of the semester, you will be required to complete various data analysis projects. As I mentioned above, they will involve the manipulation of data, the writing of programs which will produce the output required, and the interpretation of the output. There will be 7 projects which, once they begin, will be due approximately once a week. As a set, they will constitute 50% of your class grade. More on that in a moment. After a given project is graded, you will be allowed to revise and resubmit. Therefore, there is no excuse for anything less than a perfect grade on a project. HOWEVER, if it appears that people are turning in a half-hearted effort so that they can get the feedback to be able to finish the project without having to struggle over difficult issues, then I will change the rules so that you're grade on a project will in some way be limited by the quality of your initial effort.

Because regression students appear to be breeding like rabbits, the size of this class has grown to several thousand. As a result, projects will be completed by pairs of students rather than individually. You choose your partner for the first 3 projects. After that, I will assign partners. As I said, half your grade in the class comes from projects.

Course Outline

I. Review of simple regression (Chs 1 and 2)
    A. Purpose of regression
    B. Line of best fit
        1. Errors and least squares criterion
        2. Calculation of b and a
    C. Standard error of estimate
    D. Meaning of b
    E. Standardized approach
    F. Example from Pedhazur
II. Other purposes of regression
    A. Contribution of multiple predictors
    B. Linear Interaction effects
    C. Simple Nonlinear relationships
    D. Categorical Predictors
    E. Nested data
    F. Nonlinear interaction effects

G. Analysis of noncontinuous dependent variables

III. Assumptions of regression (Berry & Ch.4 of Cohen)

IV. General multiple regression (Chs. 3 & 5)

A. Meaning of b

B. Significance tests for R and B

C. Multicollinearity

D. Stepwise vs. Hierarchical

V. Moderated Multiple regression (MMR: Chs. 6 and 7)

A. What is a moderator?

B. Hierarchical test of significance for moderator

C. Plotting interactions

D. Power considerations

E. Nonlinear effects

F. Nonlinear interactions

Va. Mediator relationships

A. How do they differ from moderators?

B. How are they tested?

C. Preacher & Hayes, bootstrapping, etc

VI. Regression with dummies (Alternative course title?: Chs. 8 & 9)

A. How does one cope with categorical predictor variables in regression?

B. How are the results interpreted?

VII. Regression diagnostics (Ch. 4)

A. Using diagnostics to identify violated assumptions

B. Using diagnostics to identify bizarre occurrences

VIII. Random Coefficient Modeling (Ch15)

IX. Logistic regression (Ch. 13)

A. Regression with dichotomous criteria

B. Interpretation of output

X. Path Analysis (Ch. 12)

A. Differences from Multiple regression

B. Differences from structural equation modeling

C. Parameter estimation and model fit.