Syllabus:  PRE 810 -- Regression Analysis (Spring 2012)

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Other required readings will be cited (and when available distributed) as topics are covered in class.  (But, the text is outstanding!)

Description:  Topics to be covered in this class focus on multiple correlation/regression techniques including polynomials, dummy, effect and contrast coding, nonlinear regression, analysis of interactions with continuous and categorical independent variables, variance decomposition, and analysis of covariance procedures.  In addition, there shall be presentations on the application of multiple prediction/correlational analyses in associated statistical procedures as logistic and canonical analyses.  The various procedures will be treated extensively and in-depth with the focus on:
(1) providing information necessary for consumers of research material;
(2) providing instruction through lectures and course requirements which emphasize appropriate use, solution and application of these methods; and,
(3) conceptual multivariate reasoning and differentiated applications.
Facility with the computer and related statistical packages is necessary (i.e., Excel, SAS and SPSS).  Some, but limited, class time will be devoted to appropriate software utilization.  In addition to the text, it will be necessary for students to have access to a desktop or portable computer (PC or MAC) and that equipment has at least one of the statistical packages noted.  Experience and skill with the computer and a statistical package is expected and essential.

Requirements:  Required computer analyses will be assigned periodically – expect three required assignments which will be due to coincide with the in-class and final examinations.  These analyses will derive from and serve as the basis for class examples and for the in-class examinations (75 - 90 min).
Completion of the required analyses plus accumulated scores on the quizzes will constitute approximately 65% of the course grade.  A comprehensive final examination is planned and will contribute 35% to the final grade.
Grading: Demonstration of mastery of course content (as defined below) on projects, quizzes and the final in ranges as follows will result in grades as shown:

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<thead>
<tr>
<th>Performance/ Mastery of:</th>
<th>Results in a Grade of:</th>
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<tr>
<td>88% or higher</td>
<td>A</td>
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<tr>
<td>80% to 87%</td>
<td>B</td>
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<td>70% to 79%</td>
<td>C</td>
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<td>65% to 69%</td>
<td>D</td>
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<tr>
<td>Less than 65%</td>
<td>F</td>
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Course Objectives:

1. Write syntax and use SPSS menus to run regression analyses. Use the SPSS statistical software package to prepare and analyze data and test hypotheses for all regression model procedures covered during the semester.

2. Create and evaluate multiple regression or correlational models to test research hypotheses.

3. Identify and interpret various components of a regression analysis from SPSS output (e.g. Y-intercept, standardized/unstandardized b weights, R and R-squared, change in R-squared, part and partial correlations, assorted tests of significance, multicolinearity, related standard errors, etc.).

4. Define and interpret partial and semi-partial (part) correlations.

5. Identify types of suppression and employ procedures to identify redundant and suppresser variables within the multiple regression context. Explain and distinguish between moderator and mediator variables in multiple regression/correlation.

6. Determine unique, shared, and unexplained sources of variability (variance decomposition).

7. Conduct analysis to determine the relative importance and ordering of predictor variables, and probabilistically, predict outcomes when desired.

8. In models which include categorical variables, use dummy coding procedures to test and interpret hypotheses associated with main and interaction effects, identify the proportion of variance associated with each effect, the t- or F-value for testing significance, and whether the effect is identified levels of statistical significant.
9. In models which include categorical and continuous variables, use dummy coding procedures to create, test and interpret hypotheses within a model, and comparing regression equations across groups. Demonstrate an understanding of effect coding.

10. Investigate nonlinear relationships using procedures that include squared (quadratic) and cubed (cubic) components in the regression model.

11. Implement least squares procedures to explore logistic and multiple set predictor/criterion relationships.

12. Determine if model assumptions have been met using regression diagnostics. Evaluate for outliers and employ procedures to examine for multicollinearity.

13. Explore and implement procedures of path, i.e., causal, models.

14. Explore and explain the model and results linked to canonical analyses for continuous variable sets, and binary/dummy coded and continuous variable sets.

15. Define and explain structure and redundancy coefficients, and tests of significance for canonical functions.

And a couple of things…

As a courtesy to fellow classmates, please eliminate interference during class by cellular phones and beepers. If these devices are necessary, please set them to a mode of silence or set them to vibrate only. Thanks. ...And,...

The staff of Services for Students with Disabilities (SSD), 135 Strong, 785-864-2620 (v/tty), coordinates accommodations and services for KU courses. If you have a disability for which you may desire an accommodation in KU classes and have not contacted them, please do so as soon as possible. And, please also see me privately in regard to this course.
Course Outline

Topic 1: Review of Simple Linear Regression and Correlation, Probability, sampling distributions, and tests of significance, Chapters 1 and 2 (1.5 weeks)

Topic 2: Underpinnings: Intro to Multiple Regression, Partial and Semi-partial Correlations, and Tests of Significance, Chapters 3 and 5 (2 weeks)

Topic 3: Explanation and Assumptions: Regression Diagnostics, Chapter 4 (1 week)

----- In-Class Exam ----- (Topics 1 to 3: February 29)

Topic 4: Curvilinear Relationships, Continuous Variable Interactions, and Scale Transformations, Chapters 6 and 7 (2 weeks)

Topic 5: Regression with Categorical Independent Variables and their Interactions, Chapters 8 and 9 (1 week)

Topic 6: Outliers, Multicollinearity, Missing Data, and Analysis of Covariance, Chapters 10 and 11 (1.5 weeks)

----- In-Class Exam ----- (Topics 4 through 6: April 6)

Topic 7: Causal/Path Analysis, Chapter 12 (1 week)

Topic 8: Logistic Regression and Analyses, Chapter 13 (1 week)

Topic 9: Canonical Analyses, Chapter 16 (1 week)

COMPREHENSIVE FINAL EXAM (MAY 9: TOPICS 1 THROUGH 9, BUT BALANCED!!)