STATISTICS 350-3
LINEAR MODELS IN APPLIED STATISTICS

Summer 2006
DAY COURSE

Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 604-291-3112 or csdo@sfu.ca

Instructor: Dr. R. Altman (SC K10551)

Prerequisites:

STAT 285 and MATH 251.

Textbook:

Applied Linear Statistical Models (w/student CD) (5th Edition) by Kutner, Nachtsheim, Neter, Li. Publisher: McGraw-Hill/Irwin

Calendar Description:

Theory and application of linear regression. Normal distribution theory. Hypothesis tests and confidence intervals. Model selection. Model diagnostics. Introduction to weighted least squares and generalized linear models.

Outline:

1. Linear models: Definition, simple and multiple linear regression models, ANOVA models. Incorporating different types of predictor variables and their interactions in the model. Matrix notation.
2. Estimation methods: Least-squares, maximum likelihood. Algebraic and geometrical interpretations.
3. Properties of least-squares estimators: Mean, variance, and covariance of least-squares estimators. Expected value of residual sum of squares.
4. Diagnostic tools: Residual plots, multicollinearity, outliers, influential observations, goodness-of-fit tests.
5. Inference: Interpretation of the parameter estimates. Hypothesis tests, p-values, confidence intervals, prediction and intervals. Inferences for a linear function of the regression coefficients.
6. General Linear Hypotheses: Additional sum of squares principle. Test for lack of fit based on the pure error sum of squares.
7. Model selection: Effect of the question of interest on the choice of model, difficulties in model selection due to multicollinearity. Automatic variable selection procedures, warnings and recommendations.
8. Special methods for ANOVA models: Linear constraints. Factor and interaction plots. Multiple comparison procedures.
9. Introduction to weighted least-squares and generalized linear models.
10. Non-parametric smoothing and residual analysis.

Grading

4 Assignment – 10% each
1 Midterm – 20%
1 Final – 40%
Students must achieve 50% on the final exam in order to pass the course.

Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.

Revised February 2006