

STATISTICS 429 "APPLIED REGRESSION ANALYSIS"

Calendar Description: H(3-1T)

Multiple linear regression model including parameter estimation, simultaneous confidence intervals and general linear hypothesis testing using matrix algebra. Applications to forecasting. Residual analysis and outliers. Model selection: best regression, stepwise regression algorithms. Transformation of variables and non-linear regression. Computer analysis of practical real world data.

Prerequisite: Mathematics 323 and 353.

Note: Statistics 421 is highly recommended as preparation.

Syllabus

<u>Topics</u>	<u>Hours</u>
Introduction to principles of regression analysis. Relationship between variables. Simple linear regression.	3
Parameter estimation in simple linear regression. Rigorous derivation of the distribution of the parameter estimators. Confidence intervals for parameters.	3
ANOVA for simple regression. Various forms of ANOVA. The precision of the estimates regression. Lack of fit and pure error including corresponding ANOVA and tests. Computer solutions.	3
Forecasting and rigorous derivation of the distribution of various predicted values: individual mean regression. Confidence intervals. Inverse regression and correlation. Computer solutions.	3
Introduction into vector and matrix algebra. Matrix operations, inverses and systems of linear equations.	3
Simple linear regression in a matrix form. Review of points 2-4 using vectors and matrices.	3
General multivariate regression in a matrix form including various forms of ANOVA. Partial and sequential F-tests. Testing a general linear hypothesis in regression.	3
Residual analysis. Residual plots. Outliers and serial correlation of residuals. Runs test and Durbin-Watson test of residuals.	3
Polynomial regression and models involving transformations of variables and dummy variables.	2
Regression algorithms: best regression and stepwise regression. Use of computer packages.	4
Nonlinear regression. Parameter estimation. Iterative algorithms.. Response surface analysis.	3
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