

Textbook: *Applied Regression Including Computing and Graphics*
by R. Dennis Cook and Sanford Weisberg (Wiley)

Prerequisite: First-year calculus *and* linear algebra; STAT 261*, 263*, 267*, *or* 367* *or* permission of the instructor.

Exclusion: ECON-351*.

Instructor: G. Wild

Evaluation: Final examination 50%
Quizzes and Assignments 50%

Outline:

1. Chapters 1-15 in textbook
2. *Elements of regression:* statement of the general regression problem, descriptive statistics, histograms, boxplots, sampling distributions, the normal distribution, hypothesis testing, confidence intervals, smoothing, bivariate distributions, independence, covariance, correlation, the bivariate normal distribution, regression based on bivariate normal data.
3. *Simple and multiple linear regression:* response and predictors, model parameters, scatterplots and scatterplot matrices, correlation coefficient, least squares estimation, the role of normality, the coefficient of determination, residuals, hypothesis testing, confidence intervals, prediction, model comparison and analysis of variance, leverage, linear combinations of parameters, regression through the origin, lack-of-fit, weighted least squares estimation.
4. *Model interpretation and model comparison:* interpreting coefficients, the multivariate normal distribution, correlation versus causation, added variable plots, confidence region, sequential fitting, stepwise selection methods.
5. *Categorical predictors:* factors, one-way analysis of variance.
6. *Transformations, diagnostics, and model assessment:* response transformations, variance-stabilizing transformations, inverse fitted value plots, Box-Cox transformations and transformations to normality, residual plots, curvature and nonconstant variance, influential cases and Cook's distance, studentized residuals, outliers.