Course: Biostat 865: Analysis of Discrete Data

Credit Hours: 3

Instructor: Professor T. J. Santner (415 Cockins Hall, tjs@stat.osu.edu, Office Hours T 2:30PM-3:20PM, F 1:30PM-2:30PM, or by appointment)

Course Web Site: http://www.stat.ohio-state.edu/~tjs/865/

Prerequisites: Knowledge of linear model theory aka Stat 742

Course Text: T. Santner and D. Duffy The Statistical Analysis of Discrete Data (Springer Verlag)

Related Texts on the Analysis of Discrete Data:


Course Objectives: To learn the theory and application of loglinear models for analyzing discrete multivariate data. To learn regression-based methods for analyzing discrete response data (with or without covariates).

Homework: Problem sets consisting of examples illustrating the theory and methods described in lecture will be assigned. We will use the S/R statistical language to perform data analysis.
**Grading:** The grades for this course will be based on the homeworks, a midterm test, and a data analysis project.
OUTLINE

I. Preliminaries
   A. Classification of discrete data problems
   B. Motivating examples

II. Inference for Univariate Discrete Responses
   A. Binomial Responses
   B. Multinomial Responses

III. Loglinear models – general theory
   A. Introduction
   B. MLE for Loglinear Models Under Poisson Sampling
   C. MLE for Loglinear Models Under Multinomial and Product Multinomial Sampling

IV. Loglinear models for discrete multivariate (cross-classified) data
   A. Introduction
   B. Two-dimensional tables
   C. Hierarchical, graphical, and direct loglinear models for arbitrary dimensional tables
   D. Numerical evaluation of MLEs
   E. Residual analysis (model criticism)
   F. Model selection–case study

V. Discrete response regression
   A. Introduction
   B. Inference for $2 \times 2$ and $2 \times T$ tables
   C. Inference for sets of $2 \times 2$ Tables (ANOVA with blocking/matching)
      • Introduction
      • Collapsing Tables-Simpson’s Paradox
      • Tests of Hypotheses
      • Point and Interval Estimation of a Common Odds Ratio