Biostatistics 695:  
Categorical Data Analysis  
Fall 2015

Instructor: Timothy D. Johnson  
Office: SPH II, M4065  
Phone: 936-1007  
e-mail: tdjtdj@umich.edu  
Office Hours: Tuesdays 1:00–2:00pm and Thursdays 10:00–11:00am/By appt.  
TA: Boxian Wei <boxian@umich.edu>, Office Hours: TBA

Lecture: Monday/Wednesday 11:30am–1:00pm, Room: SPH II M1152  
NOTE: No class on Monday, Oct. 19 (Fall Study Break)

Grading:  
Homework: 10 assignments, 6–10 problems each (25%)  
Exam 1: Wednesday, Oct. 14, 11:30–1:00pm (25%)  
Exam 2: Wednesday, Nov. 18, 11:30–1:00pm (25%)  
Exam 3: Friday, Dec. 18, 1:30–3:30pm (25%)

Text: Categorical Data Analysis, 3rd Ed.  
Alan Agresti  
Wiley, 2013

Course Description: This course surveys theory and methods for the analysis of categorical data. The main subject areas are analysis of contingency tables, chi-square and exact tests, logistic models under binomial and multinomial sampling, log-linear models under Poisson sampling and their applications to perform contingency table analysis for nominal and ordinal variables. Methods of maximum likelihood estimation and goodness of fit procedures are discussed. GLMs will be heavily utilized with an emphasis on model building and interpretation. Examples will be illustrated in R. Students are expected to use R (or SPlus), when necessary, for all homework assignments.

Competencies covered in this course:

Core Competencies:

1. Describe basic concepts of probability, random variation, and commonly used statistical probability distributions. (partial)

2. Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met. (partial)

3. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions. (partial)

4. Apply descriptive techniques commonly used to summarize public health data. (partial)

5. Apply common statistical methods for inference. (partial)
6. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question. (partial)

Biostatistics:

1. Develop knowledge to communicate and collaborate effectively with scientists in a variety of health-related disciplines to which biostatistics are applied (e.g. public health, medicine, genetics, biology; psychology; economics; management and policy). (partial)

2. Become well-versed in the application of core statistical techniques (biostatistical inference, linear regression, generalized linear models, analysis of variance (ANOVA), linear mixed models) and 4-5 selected statistical specialization techniques. (partial)

3. Select appropriate techniques and apply them to the processing of data from health studies. (partial)

4. Interpret the results of statistical analysis and convert them into a language understandable to the broad statistical community. (partial)

5. Develop written and oral presentation skills and other scientific reporting skills, based on statistical analyses for public health, medical and basic scientists and educated lay audiences. (partial)

Academic Integrity: The faculty of the School of Public Health believes that the conduct of a student registered or taking courses in the School should be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty members, guest lecturers, administrative support staff, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the School.

Student academic misconduct refers to behavior that may include plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials (including library materials), and aiding and abetting the perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each student's own effort. Reference sources should be indicated clearly. The use of assistance from other students or aids of any kind during a written examination, except when the use of aids such as electronic devices, books or notes has been approved by an instructor, is a violation of the standard of academic conduct (Standard of Academic Conduct, University of Michigan School of Public Health).