STAT 305
Introduction to Biostatistical Methods for Health Sciences

Spring 2012
Day Course
Statistics Workshop

Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca

Instructor: Dr. Darby Thompson
Lab Instructor: Robin Insley

Prerequisite:

STAT 201 or 203.
Students cannot obtain credit for STAT 305 if they already have credit for STAT 302 or 350, or if they are simultaneously enrolled in STAT 305 and either or both of STAT 302 and 350. Statistics major and honors students may not use this course to satisfy the required number of elective units of upper division statistics.

Textbook:

Principles of Biostatistics, 2nd Edition, Pagano M, Gauvreau K.. Pacific Grove, CA: Duxbury, 2000.

Course Description:

Intermediate statistical techniques for the health sciences. Review of introductory concepts in statistics and probability including hypothesis testing, estimation and confidence intervals for means and proportions. Contingency tables and the analysis of multiple 2x2 tables. Correlation and regression. Multiple regression and model selection. Logistic regression and odds ratios. Basic concepts in survival analysis. **Quantitative**

Outline:

This course provides an opportunity for the further development of analytic skills acquired in basic courses in statistics and the health sciences. It concentrates on the relatively few techniques that are currently most used in health research, but it also seeks to provide a conceptual basis for understanding other techniques as well. An attempt is made to focus on unifying principles and widely applicable methods as opposed to presenting an array of unrelated ad hoc methods. The material is presented descriptively, from the point of view of understanding and practical use.

The emphasis of the course is on analysis (rather than design) of primarily observational studies where there is one outcome variable of primary interest and where the data are made up of multiple independent observations. Important areas not covered are: classical multivariate analysis (e.g., factor analysis, discriminant analysis, etc.), longitudinal data analysis, time series, random effects models, and experimental design considerations (e.g., Latin squares, etc.).

Objectives:

By the end of the course the participant should:

1. understand the concept of a statistical model and how such models correspond to specific hypotheses or questions,
2. be able to interpret the results of an analysis in relation to the original questions or hypotheses that motivated the analysis,
3. be familiar with data analysis methods commonly used in health sciences and understand the basic limitations of competing methods,
4. understand and be able to critique the analysis methods described in published health research papers,
5. be able to communicate effectively with statistical consultants.

Topics:

The scheduling of the following topics is approximate:

1. Review of introductory statistics: Hypothesis testing, estimation and confidence intervals for means and proportions.
2. Review of basic concepts of probability with applications including diagnostic testing, sensitivity and specificity, the relative risk and the odds ratio.
3. Contingency Tables: The Chi-square test, r x c tables, multiple 2x2 tables, Simpson's paradox, Mantel-Haenszel method.
4. Correlation and simple linear regression: Regression concepts, estimation and testing for regression coefficients, evaluation of the model.
5. Multiple linear regression: Inference for regression coefficients, confounding and interaction, indicator variables, model selection, prediction, model assumptions and checking.
6. Logistic regression: Odds ratios, inference for regression coefficients, model assumptions and checking, case-control studies.
7. Time permitting: Survival analysis including life tables, censoring, Kaplan-Meier method, log-rank test.

Grading Scheme:

Assignments – 25%
Quizzes – 25%
Final Exam – 50%
Grading is subject to change

Examinations:
There will be in-class quizzes and final which are closed book examinations. Exam questions will be of a general nature and emphasize the interpretation of analysis results rather than complex formula calculations. The students will not be required to memorize formulas and may bring a two-sided formula sheet into the exams.

Assignments:
In completing assignments, consultation with other students regarding computer programming methods and difficulties is allowed and encouraged. You should, however, come to your own conclusions, and be prepared to defend them. Methods used should be described and shown, and brief computer output should be included with the answer. Some familiarity with the JMP statistical package will be helpful.

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.

Students looking for a Tutor should send an email to stat@sfu.ca with "Tutor Request" in the subject line. Please only include information that you would like forwarded to our tutors mailing list.

Revised November 23, 2011