

**Biost / Stat 579**  
**Data Analysis and Reporting**

**Syllabus**  
Fall, 2011

**Course Catalog Description:** Analysis of real data to answer scientific questions. Common data-analytic problems. Sensible approaches to complex data. Graphical and tabular presentation of results. Writing reports for scientific journals, research collaborators, consulting clients. Graduate standing in statistics or biostatistics or permission of instructor.

**Instructor** : Scott S. Emerson, M.D., Ph.D., Professor of Biostatistics  
Office : HSB F673  
Phone : 616-6678 (Biostatistics)  
Email : semerson@uw.edu  
Office hours : Tu 2:00p - 5:00p  
(or by appointment)

**Time and Place** : Lectures : TBA

**Class Web Pages:** <http://www.emersonstatistics.com/b579/>

The web page will be used to post copies of any PowerPoint slides presented in lecture, homework assignments, datasets, documentation, other information, etc. I urge you to check this site regularly.

**Prerequisites** : Biost 518 or equivalent

**Computing** : Software : R (or Stata)

Weekly homeworks will involve statistical analyses that will generally require access to statistical software. Students may use the statistical software of their choice, so long as the software is capable of performing the necessary statistical procedures. Help with computing assumes the use of R or Stata.

**Attendance** : Required

**Assignments** : Data analysis problems weekly with partial write-ups and oral presentations / discussion  
One written report of a data analysis

Homework problems requiring a written solution will be due approximately weekly. These assignments will consist of applications of statistical methods to real data analyses. Key to successful completion of the data analyses will be the appropriate choice of statistical methods to answer a scientific question. On one occasion during the quarter, the instructor will designate a data analysis requiring a written report from the students. The length of the report should be approximately 15 - 20 pages, and it should be written to a statistically naive reader. Reports will be "refereed" by other students. Further details (and examples) will be distributed later in the quarter.

<b>Grading</b>	:	Written homeworks	25%
		Oral discussion	25%
		Report	50%

### Course Objectives

This course provides a practicum in the statistical analysis of data. Emphasis is placed on the analysis of data to answer scientific questions. Thus the major objectives of this course are

1. To explore the ways in which various statistical methods can be used to address scientific questions,
2. To gain experience in the preparation of complete statistical analysis plans,
3. To teach a general approach to a data analysis problem,
4. To gain experience in the generation of tables and figures that communicate suitable description of the data, and
5. To gain experience in the presentation of statistical inference to an applied audience.

At the end of Biost / Stat 579, a student should be able to:

1. Demonstrate an organized approach to the analysis of complex data gathered to address a scientific question.
2. Develop an appropriate statistical model to analyze such data to address a scientific question, including
  - a. refinement of vaguely stated scientific hypothesis into a statistical framework,
  - b. identification of the dependent (response) variable, including a reasonable probability model for that response and a summary measure to be estimated and/or tested,
  - c. identification of the independent (predictor) variables denoting any groups to be compared.
3. Perform suitable descriptive analyses of the data, including descriptions relevant to the sampling scheme and any patterns of missing data.
4. Compute estimates and/or test statistics using standard statistical software.
5. Correctly interpret the meaning of all model parameters as they relate to the scientific question originally posed.
6. Make statistical inference about the generalizability of the analysis results to a larger population.
7. State any statistical assumptions that are the basis for the conclusions of your analysis.
8. Perform analyses to determine whether the assumptions are sensible both on sample-wide and individual case bases.
9. Present the results of your analysis to a statistically naive reader, including a full discussion of how the statistical results impact future experiments.