

Statistical Analysis of Scientific Data GE398 - Spring 2013

Professor Alan L. Kafka
Department of Earth and Environmental Sciences, Boston College
Office Hours: T-Th 3:30-4:30, Devlin 312
Web Site: www2.bc.edu/~kafka

Lecture: T Th 1:30-2:45, Devlin 201

This syllabus provides a basic summary of the course. Other course materials will be posted on the course web site, which is on the BC *Blackboard* course management system.

Description of Course: Scientific investigations involve gathering data, analyzing data for testing hypotheses, and interpreting the results of data analysis to develop theories about how the natural world works. This course covers statistical methods commonly used to analyze and interpret many different types of scientific data. In addition to the data analysis and interpretation aspects of this course, we will also be concerned with how to effectively report and present the results of scientific investigations. Topics include: methods of organizing and describing data, probability, random variables, the normal distribution, sampling, confidence intervals, hypothesis testing, comparing two populations, correlation, and regression. The term project requires students to use the statistical concepts taught in class to analyze a real data set, and to present the results of that investigation in both oral and written form.

Textbook: *Introduction to Probability and Statistics (13th Edition)* by W. Mendenhall, R.J. Beaver, and B.M. Beaver.

Some Suggested Reading (Not Required):

- *The Cartoon Guide to Statistics* by Larry Gonick and Woolcott Smith
- *Uncertain Science... Uncertain World*, by H.N. Pollack
- *How to Lie with Statistics*, by Darrell Huff

Grades will be based on:

- (1) Two In-class Exams (22% of course grade each). Tentative dates are: February 26, 2013 and April 4, 2013.
- (2) Final Exam (23% of course grade), May 7, 2013, 9:00 AM.
- (3) Term Project: Paper and Presentation (33% of course grade).

There are many practice exercises in the book that you should be working on routinely to help you prepare for the exams: Some with worked solutions, some with just answers, and some without answers. You should develop a routine of doing as many of those exercises as you are able to throughout the semester.

Research Project: For this course, you will conduct a scientific research project on any topic that you are interested in investigating. Work on this research project will involve in-class presentations and discussions of your progress, a Research Report (due near the end of the semester), and an Oral Presentation of your project (also near the end of the semester). All of these components of your project will count for a total of 33% of your course grade.

Lecture Outline: The following is a tentative list of topics that will be covered this semester.

- Describing Data with Graphs
- Describing Data with Numerical Measures
- Describing Bivariate Data
- Probability and Probability Distributions
- The Normal Probability Distribution
- Sampling Distributions
- Large-Sample Estimation
- Large-Sample Tests of Hypotheses
- Inference from Small Samples
- Regression and Correlation
- Nonparametric Statistics
- Possible Additional Topics

Academic Integrity:

Boston College values the academic integrity of its students and faculty. It is your responsibility to familiarize yourself with the university's policy on academic integrity, which can be found at www.bc.edu/publications/ucatalog/policy.shtml#integrity. Violation of academic integrity will be reported to your class dean and judged by the academic integrity committee in your school. If you are found responsible for violating the policy, penalties may include a failing grade as well as possible probation, suspension, or expulsion, depending on the seriousness and circumstances of the violation.

Note: Students are responsible for knowing all of the information in this syllabus. There may be corrections or addenda to what is written here, and if so they will be posted on the course *Blackboard* website. The most current version of syllabus will always be the version on the web.