“To be worthy of its name, every physical theory should contain within itself the means not only of predicting the relevant quantities, but also of predicting their uncertainties” attributed to Sir Harold Jefferys (1938)

CLASS TIME: M, W, F 10:50-11:40, EWS 209

INSTRUCTOR: Scott White, 777-6304, smw@sc.edu, EWSC 314
Office Hours: most day after class or by appointment at other times

TEXTBOOK: none, Assigned reading will be provided via Blackboard
Material will be drawn from the USGS Primer on Geostatistics and the NIST Engineering Statistics E-handbook chapter on Exploratory Data Analysis (http://www.itl.nist.gov/div898/handbook/index.htm)

LEARNING OBJECTIVES:
This is a graduate class and satisfies part of the Geological Sciences degree breadth requirement, and you will be expected to work independently on projects using datasets that are relevant to your particular research and interests.
At the conclusion of this course, students should be able to:
1. Make informed decisions about proper handling of geological data in a research setting.
   Apply this to the data types you will be using in your graduate research.
2. Understand how scientific data can be used and misused.
3. Be aware of tools available for geological data analysis and visualization and become familiar with data analysis software suitable to your own research.

Course Grading:
Project 1: Map construction (15 points)
   Chances are that if you're in geosciences, you will need to make a map to show the geospatial location of your data. This project has you develop this skill by producing maps at a small-scale (e.g. 1:1,000,000) showing political/natural boundaries, small-scale (e.g. 1:20,000) showing local features/contours, and 3-D perspective.
Project 2: 2-D analysis (25 points)
   This project will let you implement exploratory data analysis on your own datasets, applying a model and a regression, produce appropriate plots and descriptive statistics. You will become familiar with using statistical software that best suits your own data. What you will analyze depends on your data, to be chosen in consultation with Dr. White, and consists of ~5 graphs with accompanying paragraph explanation and interpretation.
Project 3: 3-D Analysis (25 points)
   Explore the difference between kriging, distance-weighted and spline interpolation while becoming familiar with using statistical software that best suits your own data. What you will analyze depends on your data, to be chosen in consultation with Dr. White, and consists of 3 graphs with accompanying paragraph explanation and interpretation.
Final is an Oral Exam (25 points)
   10-minute oral presentation, present graphs from your 3 projects to the class and explain your analysis and defend it during 5 minute Q&A.
Class Participation 10 points (n.b. about 1 point per week)

As per University Policy, an "excused absence" from class still counts as an absence. If you must miss class, it is the student's responsibility to get any material or announcements from a classmate.

Topics Covered:
Experiment Design & Data Collection, Analysis of Data Interpretation, and Data Presentation
Univariate data, 2-D data as a time series or spatial profile, 3-D data and contouring.