

# Quantitative Techniques in the Geological Sciences

Geol Sci 5375 - 001 T 10:30 - 12:20 Lab TBA  
CRM 17453  
Room 320 Geology

Prof. Nicholas Pingitore  
206/205 Geology  
747-5754  
nick@geo.utep.edu

An introduction to the univariate and multivariate statistical computer techniques used to extract information from matrices (tables) of geologic and environmental data. Emphasis will be placed on practical experience with the computer (e.g., weekly laboratory assignments). The SPSS package, available in a number of PC versions, will be utilized. Additional packages may be introduced for specific techniques.

## CLASS FORMAT:

Approximately the first two-thirds of the course will consist of standard lecture/classroom format, with laboratory exercises based on the lecture materials. Geological and environmental examples will be emphasized; material from other fields will be employed as appropriate. Professor will be available for consultation during hours TBA. The last one-third of the course will be devoted to individual projects based on data sets generated from thesis work or the literature. Results will be presented formally to the class in a seminar.

## GRADES:

Classroom participation, laboratory assignments, seminar presentation, and perhaps an examination will be the basis for a student's grade. Approximate weighting will be 10:20:35:35. I am willing to consider other grading options. But at the end of the day, my theory of grading comes down to: *Show me that you can dance.*

## COURSE OBJECTIVES:

I anticipate that different students will come away from the course with different types and degrees of "value added" to their intellectual and professional armamentarium. The types of skills or insights that you might take away from this course include:

- Fundamental understanding of basic statistics
- A powerful toolbox for your thesis or dissertation research
- Ability to manipulate and interpret large data sets, or "big data"
- Better or more critical understanding of the scientific literature
- A new way to view everything in the world and in your life

#### PREREQUISITES:

Prior statistical and mathematical experience, while helpful, is not necessary. The course is designed to provide the intelligent and motivated student with the tools and understanding to permit the use of the computer to attack geologic and environmental problems from a multivariate statistical approach.

#### TEXT:

None, but one or more will be suggested for reference. Plenty of hand-outs will be handed out. The SPSS PC Package has an extensive *Help* toolbar that supposedly takes the place of a manual.

#### TOPICS:

The course should include, but not be limited to, the following topics:

Science, logic, probability, and statistics

Data presentation

Matrix algebra - a nonfatal dose

Univariate statistics - central tendency, variation, hypothesis testing, regression, correlation.

Non-parametric statistics - chi-square tests.

Multivariate statistics - multiple regression, factor analysis, discriminant analysis

(emphasis will be placed on these three topics).

Data management and decision making.

The fine print:

Please inform me as soon as possible about any classes which you anticipate you will be unable to attend.

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to [cass@utep.edu](mailto:cass@utep.edu), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [www.sa.utep.edu/cass](http://www.sa.utep.edu/cass).

The use of any electronic or other recording device in class is not allowed without the written permission of the instructor. Student ethical and overall behavior during this course is expected to conform to current standards for students at UTEP, as outlined in the Undergraduate Catalog. Full details are found in the *Handbook of Operating Principles*, available in the Office of the Dean of Students and on the Dean's homepage.

All grades of Incomplete must be accompanied by an Incomplete Contract that has been signed by the instructor of record, student, departmental chair, and the dean. Although UTEP will allow a maximum of one year to complete this contract, the College of Science requests it be limited to one month based upon completion data. A grade of Incomplete is only used in extraordinary circumstances confined to a limited event such as a missed exam, project, or lab. If the student has missed a significant amount of work (e.g. multiple assignments or tasks), a grade of Incomplete is not appropriate or warranted.