

GEOL 518
Quantitative methods in geology and geological engineering

Instructor: Dr. Louis Zachos, 118G Carrier Hall, 915-8827, lgzachos@olemiss.edu

Textbook: Davis, John C., Statistics and Data Analysis in Geology, 3rd Edition (2002, Wiley, New York). ISBN: 0-471-17275-8 (Required). Trauth, Martin H., MATLAB[®] Recipes for Earth Sciences (2007, Springer, New York). ISBN:0-978-3-72748-4 (Optional).

Prerequisites: At least 2 semesters of calculus required. Coursework in linear or matrix algebra desirable.

Course Objectives: Students successfully completing this course will be able to ...

1. Describe the mathematical principles underlying a variety of analytical methods applied in geology and geological engineering.
2. Apply computational methods to practical problems in geology and geological engineering, including:
 - Basic statistical tests
 - Solution of systems of linear equations
 - Eigenvalues and eigenvectors
 - Curve-fitting and regression, including multiple regression
 - Time series and correlation methods for sequential data
 - Principal components analysis
 - Independent components analysis
 - Cluster and discriminant analysis
3. Use MATLAB[®] for analysis of problem sets and generation of high quality 2-D and 3-D graphs.

Students enrolled in the course will also complete a project on a selected or assigned topic involving analysis of a geological or geological engineering problem, including a written project report stating objectives, materials and methods, results, and conclusion. Depending on the number enrolled, this may also include oral presentation of the student projects.

Course Assessment:

Class Participation (25%)

Assignments (25%)

Class exercises (25%)

Project report and presentation (25%)