**The Hashemite University**
**Faculty of Natural Res. & Environment**
**Dept. Land Management & Environment**
**2nd Semester, 2011-2012**

**Dr. Mohammed I. Al-Qinna**
**qinna@hu.edu.jo**
**Soil Spatial Variability (1202471)**
**3 Credit Hours (2+3)**

**Course Description:**
The course introduces sampling strategies for spatially variable. The course covers the role of spatial and temporal statistics in quantifying the magnitude and direction variabilities of soil properties. The course focuses on land management using s.

**Aims:**
- Introduce students to the concept of regionalized variable.
- Educate and train students on spatial-analysis models with emphasis on some soil applications.
- Differentiate between the point variables and core sampling variables in geospatial analysis.

| Course Outline | Week |
|---|---|
| **Introduction**<br>Statistics defined, statistics history, observations, variables, data presentation, one variable, two variables, three variables, regionalized variables. | 1 |
| **Data Exploration**<br>Introduction, population and sampling theory, concepts and types of variables, measures of central tendency, measures of dispersion, measures of shape, outliers, probability distributions, test of normality. | 2-3 |
| **Data Analyses**<br>Introduction, regression model analyses, curve fitting, criteria for choosing the "best fit", nonlinear estimation. | 4-5 |
| **Correlogram**<br>Autocorrelation analysis, idealized correlograms, correlation length, correlation shape, Moran I test, applications. | 6-7 |
| **Semi-variogram**<br>Fundamental principle of semi-variance, semi-variogram analysis and its components, semi-variograms models, applications. | 8-9 |
| **The Volume-Variance Relationship**<br>Regularization, semivariograms for core samples, volume variance calculations, grade/tonnage curves, applications. | 10-11 |
| **Estimation**<br>Introduction to the weighting factors, corner point technique, inverse distance technique, variogram weighting factor technique, examples. | 12-13 |
| **Kriging**<br>Introduction, punctual kriging, block kriging, universal kriging, kriging examples, kriging exploration. | 14-15 |
| **Temporal Analysis**<br>Definition of time scale variability, choosing the best fit, ARIMA, Seasonal ARIMA, applications | 16 |

**Textbook**

Donald Nielsen. 2003. Spatial and Temporal Statistics. Sampling Field Soils and Their Vegetation. GeoEcology, Germany.

**Extra Books**

1. Isobel Clark. Practical Geostatisitcs.
2. Soil Science Society of America (SSSA). 1996. Applications of GIS to the Modeling of Non-Point Source Pollutants in the Vadose Zone. Special Publication Number 48. Madison, Wisconsin, USA.
3. John C. Davis. 2002. Statistics and data analysis in geology. Wiley, John & Sons, Incorporated.
4. Roussos Dimitrakopoulos. 1993. Geostatistics for the next century. Kluwer
5. Rawlings, J.O, S.G. Pantula, and D.A. Dickey. 1998. Applied Regression Analysis: A Research Tool. Second Ed. Springer-Verlag, New York, Inc.
6. Wellmer, F.W. 1998. Statistical Evaluations in Exploration for Mineral Deposits. Springer, Berlin.

**Programs**


**Evaluation**

***Theory (70%)***

| | |
|---|---|
| First Hour Exam | 15% |
| Second Hour Exam | 15% |
| Final Hour Exam | 40% |

***Laboratory (30%)***

| | |
|---|---|
| Midterm | 10% |

| | |
|---|---|
| Final Exam | 20% |

**The Hashemite University**
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**Dept. Land Management & Environ.**
**2nd Semester, 2007-2008**

**Dr. Mohammed I. Al-Qinna**
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**Soil Spatial Variability Lab (1202471)**
**One Credit Hours**

**Aims are to:**

- Introduce the students to the computer technology for handling geological data.
- Practice on entering, managing, and statistically analyzing different geological informations by computer.
- Allow the students to use different spatial programs to model and estimate a set of spatial geological data into kriged maps.

| Course Outline | Week |
|---|---|
| Database and data Entry | 2 |
| Data Distribution Analysis | 3 |
| Testing Normaility | 4-5 |
| Correlation Analysis | 6 |
| Semivariogram Analysis | 7-8 |
| Kriging | 9 |
| Spatial Analysis in Practice | 10-11 |
| Temporal Statistics | 12 |

**Evaluation**

***Laboratory (30%)***

| | |
|---|---|
| Midterm | 10% |
| Final Exam | 20% |