(3 credits)
001-2-6046

Lectures (hrs/week) - 3
Description:
Spatial analysis consists of the processes, methods and tools for managing and analyzing spatial data for developing spatial information.
The course focuses on the principles and concepts of spatial analysis by exploring its application in the analysis of geospatial environmental data. It is designed for students with former knowledge of GI-Science and Systems who wish to deepen their understanding and advance their analytical capabilities of analyzing geo-spatial data.
Subjects covered range from data mining of geospatial data, structure of GIS relational database systems, understanding complex data models and geo-visualization. Each lesson will be divided into a theoretical lecture followed by an exercise using a case study in which students will apply the concepts that were presented in the lecture. Case studies from research fields relevant to the students' personal research interest will be used as demonstrations. Exercises will be conducted using the ArcGIS® software package.

The main objectives of the course are:
 To provide the students with an advanced understanding of the concepts and methods of spatial analysis within the framework of GIS.
 To apply these methods to environmental research and to real-world environmental problems focusing on arid environments.
 To gain hands-on experience on the use of advanced GIS software for analysis, prediction, modeling and visualization of environmental phenomena.

Prerequisite:
Theory and Applications of Geographic Information Systems or equivalent (subject to approval by instructor(

Evaluation:
Attending 90% of the classes is compulsory - regular attendance is necessary to succeed in this course.
Grading will be based on weekly exercises (30%) and on a semester project (70%(
The project will consist of developing and applying a GIS model for spatial analysis, relevant to the student's field of interest. Project will be personal and developed throughout the semester. Project will be evaluated based on two assignments: an oral Power Point presentation of the work and a paper based on the project. Both will be submitted at the end of the semester.

The course will include the following topics:
 Introduction to spatial analysis: concepts and methods.
 Geospatial data mining.
 Relational database design and management.
 Mathematical techniques used in GIS.
 Complex data models.
 Spatial statistics with GIS: measuring geographic distributions, analyzing patterns and modeling spatial relationships.

 Spatial interpolation and prediction: Triangulated Irregular Networks (TIN), Regression for prediction, Inverse Distance Weighted (IDW), Spline, Kriging and error evaluation.
 Network analysis.
 3D modeling and data visualization.

Instructor: Dr. Aviva Peeters apeeters@bgu.ac.il
Recommended reading:
1. Fischer, M. M., Getis, A. (Eds.), 2009, Handbook of Applied Spatial Analysis: Software tools, Methods and Applications, Springer-Verlag, Berlin.
2. Lloyd, C. D., 2010, Spatial Data Analysis: An Introduction for GIS Users, Oxford University Press, Oxford.
3. Longley, P. A., Batty, M. (Eds.), 2003, Advanced Spatial Analysis: The CASA Book of GIS, ESRI Press, Redlands, CA.
4. Maguire, D., Batt, M., Goodchild, M., 2005, GIS, Spatial Analysis and Modeling, ESRI Press, Redlands, CA.
5. Course Exercise Manual, Supplied by instructor.

Additional recommended reading will be based on student's field of research such as:
1. Fortin, M. J., Dale, M. R. T., 2005, Spatial Analysis: A Guide for Ecologists, Cambridge University Press, Cambridge.
2. Mesev, V., (Ed.), 2007, Integration of GIS and Remote Sensing, John Wiley & Sons, Ltd., West Sussex.
3. Maantay, J., Ziegler, J., 2006, GIS for the Urban Environment, ESRI Press, Redlands, CA.
4. Parker, R. N., 2008, GIS and Spatial Analysis for the Social Sciences: Coding, Mapping and Modeling, Routledge, New York.