Environmental Applications of GIS: Spatial Analysis and Modelling

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GENERAL

SCHOOL	School of Environment		
ACADEMIC UNIT	Department of Environment		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	**ENV531**	**SEMESTER**	**Spring**
COURSE TITLE	Environmental Applications of GIS: Spatial Analysis and Modelling		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	
Laboratory	4	
Course Total	6	3
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE	skills development
PREREQUISITE COURSES:	Introduction to Geospatial Analysis (IGA) or certified basic knowledge of ArcGIS Desktop
COURSE WEBSITE (URL)	https://aegeanmoodle.aegean.gr/course/view.php?id=6325

LEARNING OUTCOMES

Learning outcomes
The postgraduate students will understand the overall concept of spatial analysis. In addition, the students will: • Be familiar with large-scale spatio-temporal data • Learn about different techniques for spatial modelling using GIS tools and scripting languages • Learn about different methods for assessing changes and trends • Present their study in a large audience using a scientific poster
General Competences
Search for, analysis and synthesis of data and information, with the use of the necessary technology Working independently Team work

SYLLABUS

The aim of the course "Environmental Applications of GIS: Spatial Analysis and Modelling" is to introduce the students to environmental applications using Spatial Analysis and Modelling. The content outline of the course comprises of the following lectures and laboratories:

- Spatial Analysis of Vector Data
- Spatial Analysis of Raster Data
- Spatial Modelling: Model Builder
- Environmental Application of GIS: Delineation of Climatic Zones, Changes and Trends
- Spatiotemporal Data Analysis Using a) Space-Time Cubes and b) Trend Analysis Using Python (Linear Regression and Mann-Kendall Test)

The students will develop spatial models to analyse timeseries of large-scale spatial data.

The students have the opportunity to study in the UoA GIS laboratories or install the software at their personal computers (under some requirements).
Software Installation Prerequisites (ArcGIS, Python):

- Windows Based Desktop or Laptop (ArcGIS cannot be installed on Mac)
- Internet Connection that the ISP allows VPN connection with the University of the Aegean to share an ArcGIS license
- At least 1 GB hard disk storage for the software installation + 3 GB hard disk storage for data

TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY</td><td>Face-to Face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td>Use of ICT, communication with students</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures/Laboratories</td><td>30</td></tr>
<tr><td>Practice at Home</td><td>20</td></tr>
<tr><td>Study and Analysis of Bibliography</td><td>5</td></tr>
<tr><td>Individual Project</td><td>20</td></tr>
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<tr><td>Course total</td><td>75</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION
.</td><td>Students will be individually graded based on:
• Individual Assessment of 2 Laboratory Exercises (50%)
• Group Assessment of Poster Presentation(50%)</td></tr>
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ATTACHED BIBLIOGRAPHY

- ArcGIS Model Builder
- Space Time Pattern Mining
- Köppen Climate Classification
- Kottek M., Grieser J, Beck Ch., Rudolf B. and Ruble F. (2006). *World Map of the Köppen-Geiger climate classification updated*. Meteorologische Zeitschrift, 15(3), 259-263.
- Fathi Goma Al Sghair (2013). *Remote Sensing and GIS for Wetland Vegetation Study*. PhD Thesis, University of Glasgow
- Forkel M., Carvalhais N, Verbesselt J., Mahecha M., Neigh Ch, and Reichstein M. (2013). *Trend Change Detection in NDVI Time Series: Effects of Inter-Annual Variability and Methodology*. Remote Sensing, 5, 2113-2144.
- Global Climate Resource Pages - University of Delaware