312. Geographic Information Systems of Environment

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1. GENERAL

FACULTY	PLANT SCIENCES		
DEPARTMENT	FORESTRY AND NATURAL ENVIRONMENT MANAGEMENT		
LEVEL OF STUDY	Undergraduate		
COURSE CODE	**312**	**SEMESTER OF STUDY**	**3rd**
COURSE TITLE	GEOGRAPHIC INFORMATION SYSTEMS of ENVIRONMENT		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING WEEKS**	**CREDITS**
Lectures		3	6
Laboratory exercises		2	
Total Course		5	
COURSE TYPE	Special Background or Core Course		
PREREQUISITE COURSES:	No		
LANGUAGE OF INSTRUCTION AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://oeclass.aua.gr/eclass/courses/571/		

2. LEARNING OUTCOMES

Learning Outcomes
The subject of the course is: Introduction to Geographic Information Systems, definition of geographical problem. Digital mapping, cartographic projections. Database Models. Organization of a Geographical Information System. Stages of digitization and correction of errors. Pre-analytical procedures. Geographical analysis. Decision making and exploring alternatives. Cartographic rendering of information. **Aim of the course** **Theoretical part** The objectives of the course are: − The acquisition of theoretical knowledge related to Geographic Information Systems and the geographical analysis of space. − The correlation of theoretical knowledge to problems of forest characteristics, such as vegetation mapping, forest management studies and cadastre. − Deepening in the process of analyzing geographical problems, data processing and decision making.

Laboratory section

- The systematic learning of the functions of Geographic Information Systems such as data digitization and correction.
- The design of geographic databases and the introduction of descriptive data into them
- Geographical operations between the digitized data.
- The analysis of a geographical problem and the decision making based on Geographic Information Systems and other software programs.

At the end of the educational process, students will be able to:

- effectively uses Geographic Information Systems for the recording of Geographical Information, such as forest inventory, mapping of burnt or encroached areas, delimitation of sensitive areas and location of game sanctuaries.
- plan the analysis of forest and environmental problems and implement the analysis using Geographic Information Systems
- take a decision based on the results of the analysis and present the results in the form of maps and diagrams, independently or as part of a comprehensive study.

General skills

- Search, analyze and synthesize data and information, using the necessary technologies.
- Decision-making
- Autonomous work
- Teamwork
- Working in an interdisciplinary environment
- Respect for the natural environment
- Promoting free, creative and inductive thinking
- Utilization of new technologies in decision making.

3. COURSE CONTENT

The material per week of the course - in theory and corresponding laboratory exercises - reads as follows:

Theory:

N/A	NOT	CONTENT OF THE TEACHING UNIT (DE)
1	WP-1	Introduction to Geographic Information Systems
2	DE-2	Cartography – Projection Systems
3	WP-3	Basic concepts of GIS
4	DE-4	Vector models
5	DE-5	mosaic models
6	DE-6	Databases
7	DE-7	Data entry into GIS
8	DE-8	Data correction topology
9	DE-9	Data management
10	DE-10	Pre-analytical procedures
11	DE-11	Space analysis
12	DE-12	Space analysis and decision making
13	DE-13	Cartographic rendering

Workshop:

N/A	NOT	CONTENTS OF THE TEACHING UNIT (DE)
1	WP-1	ArcGIS Software Interface (Basic Commands, ArcCatalog, ToolBox)
2	DE-2	File types in GIS - Projective Systems
3	WP-3	Methods Digitizer

4	DE-4	Georeferencing mosaic archive
5	DE-5	Digitize image from PC screen
6	DE-6	Digitization of spatial entities
7	DE-7	Topology-Error corrections Digitizer
8	DE-8	Database Design and Introduction of Descriptive Features
9	WP-9	Management of thematic layers (Create a new layer, selection, spatial connection).
10	DE-10	Geographical operations (Selection, proximity analysis, overlap of thematic layers etc)
11	DE-11	Data analysis and decision making
12	DE-12	Problem analysis automation (Model Builder)
13	DE-13	Create a final map.

4. TEACHING AND LEARNING METHODS – ASSESSMENT

DELIVERY METHOD	In the hall, in the Laboratory and adjacent to the facilities of the Department forests and woodlands.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use PowerPoint slides, use physical maps, communicate with students via video conferences, Open eClass, email, and telephone. Meetings with students per person to answer questions and prepare laboratory exercises.
TEACHING ORGANIZATION	

Activity	***Semester Workload***
Lectures	39
Laboratory Exercises	26
Work	20
Study personal	65
Total course	150

STUDENT EVALUATION	I. Written final exam in the theory of the course. II. Answering multiple-choice questions II. Written or oral examination in the laboratory part of the course. III. The exam includes the development of equally graded development questions, or the resolution of exercises announced to students at the beginning of the course. The examination criteria are explicitly mentioned, especially in the laboratory part. The relevant information can be found in the University's eClass

5. RECOMMENDED-BIBLIOGRAPHY

Suggested Bibliography:

- Karteris, M. (1993). Remote Sensing of Natural Resources and Geographic Information Systems.
- Kollia, V., Kalyvas, D., Triantakostantis D., 2012. Geographic Information Systems. Embryo Publications, pages, 282.
- Koutsopoulos, K. (2002). Geographic Information Systems and Spatial Analysis (Athens: Papasotiriou), p. 401.
- Koutsopoulos, K., and Androulakakis, N. (2003). Applications of Geographic Information Systems with ARCGIS (Athens: Papasotiriou), p. 397.
- Maniatis, I. (1993). Geographical Land Information Systems – Cadastre.

- Burrough, P.A., and McDonnell, R.A. (1998). Principles of Geographical Information Systems (Oxford), p. 333.
- Heywood, I., Cornelius, S., and Carver, S. (2002). An Introduction to Geographical Information Systems. (Prentice Hall), p. 296.
- Johnston, C. (2005). Geographic Information Systems in Ecology (ION), p. 279.
- Longley, P.A., and Batty, M. (1997). Spatial Analysis: Modelling in a GIS environment (John Wiley & Sons), p. 392.
- McDonnel, R., and Kemp, K.K. (1996). International GIS Dictionary (John Wiley & Sons), p. 112.
- Zeiler, M. (1999). Modeling Our World: The Esri Guide to Geodatabase Design (ESRI Press), p. 200.

Related scientific journals:

- Canadian Journal of Forest Research (CAN J FOREST RES) https://www.researchgate.net/journal/Canadian-Journal-of-Forest-Research-1208-6037
- Computers and Electronics in Agriculture https://www.journals.elsevier.com/computers-and-electronics-in-agriculture
- Ecological Informatics https://www.sciencedirect.
- Ecological Modelling https://www.journals.elsevier.com/ecological-modelling
- Journal of Geographic Information System https://www.scirp.org/journal/journalarticles.aspx?journalid=114
- International Journal of Geographical Information Science https://www.tandfonline.com/toc/tgis20/current
- Computers & Geosciences https://www.journals.elsevier.com/computers-and-geosciences
- Cartography and Geographic Information Science https://www.tandfonline.com/loi/tcag20
- Environmental Modelling & Software https://www.journals.elsevier.com/environmental-modelling-and-software
- GIScience & Remote Sensing https://www.tandfonline.com/loi/tgrs20
- Landscape and Urban Planning https://www.sciencedirect.com/journal/landscape-and-urban-planning
- American Journal of Geographic Information System http://www.sapub.org/journal/aimsandscope.aspx?journalid=1053

Related Web Addresses:

- http://www.gis.com/
- http://giswin.geo.tsukuba.ac.jp/sis/en/gis_and_remote_sensing_links.html (links)
- http://www.heal-link.gr/?st=1&accepted=1 (Scientific publications)