University of Zagreb Faculty of Agriculture
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GIS and Natural Resources (152063)

Course coordinator

Assoc. Prof. Hrvoje Kutnjak, PhD

Course description

Nowadays it is obvious and generally accepted that natural resources can not be managed in a classical way. For proper management of natural resources geographic information system (GIS) should be established. The aim of this module is to give students knowledge about geographic information systems and also the basics of remote sensing, basically about usage of different kinds of images for management of natural resources.
During lectures and practical work students will got knowledge about GIS and similar technologies (global positioning system, digital elevation models). Within the GIS, explanations about: different kind of GIS models, different kind and forms of data (geographic data, attribute data and their maintenance), techniques for merging geographic and attribute data, queries and analysis of spatial data will be given. Students will also got knowledge about scanning, digitizing and vectorisation of maps as well as cartographic datums and projections and georeferencing of scanned maps. They will also learn about practical use of GIS as well as methods of maps and reports creation and printing.

ECTS: **3.00**

English language: **L1**

E-learning: **L1**

Teaching hours: 30
Lectures: 12
Practicum: 18

Lecturer

- Assoc. Prof. Hrvoje Kutnjak, PhD
- Asst. Prof. Vladimir Kušan, PhD

Associate teacher for exercises

- Asst. Prof. Vladimir Kušan, PhD
- Assoc. Prof. Hrvoje Kutnjak, PhD

Grading

Sufficient (2): 60-69 %
Good (3): 70-79 %
Very good (4): 80-89 %
Excellent (5): >90%

Type of course

- Graduate studies / MS Courses taught in English (Elective course, 1 semester, 1 year)

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Types of instruction

- Lectures
- Auditory Exercises
- Practicum
- Field work
- Seminars

Learning outcomes

Learning outcome	Evaluation methods
gain practical experience using GIS to solve a real world problem;	written exam, oral exam
understand the basic geography of the earth and how it is mapped;	written exam, oral exam
understand the basic spatial questions that can be addressed with GIS;	written exam, oral exam
understand the key components and tools of any GIS program and how they work;	written exam, oral exam
collect and manipulate spatial data using GPS;	written exam, oral exam
establish new data base, to update existing data bases, to analyse spatial information;	written exam, oral exam
create digital elevation models (DEM);	written exam, oral exam
conduct spatial analysis and create new information through the GIS.	written exam, oral exam

Methods of grading

Evaluation elements	Maximum points or Share in evaluation	Grade rating scale	Grade	Direct teaching hours	Total number of average student workload	ECTS
written exam		0-59 60-70 71-80 81-90 91-100	Insufficient (1) Sufficient (2) Good (3) Very good (4) Excellent (5)	30	90	3
Total	100	-	-	30	90	3

Evaluation elements	Maximum points or Share in evaluation	Grade rating scale	Grade	Direct teaching hours	Total number of average student workload	ECTS
oral exam		0-59 60-70 71-80 81-90 91-100	Insufficient (1) Sufficient (2) Good (3) Very good (4) Excellent (5)	30	90	3

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Total	100	-	-	30	90	3

Weekly class schedule

1. Introduction to GIS L - Introduction to Geographic Information System. Historical Review. Definitions of terms. Geographical information systems. The benefits of GIS.
2. Ways of establishing GIS L, A - Methods and systems of GIS design. Types and characteristics of computer hardware and software necessary for GIS.
3. Databases in GIS L - File formats for various databases. The vector and raster GIS.
4. Establishment and maintenance of databases P - Establishing and maintaining databases. Geometric data (raster and vector). Attribute data (numerical, descriptive).
5. Data entry Lab - Input data (map projection and dates, scanning, digitizing and vectorization, geocoding)
6. Link between geometric and attribute data P - Linking digitized data bases. Establishment of permanent and virtulanih relationship between geometric and descriptive data.
7. Data search and analysis P - Data analysis in GIS, search by location and / or attributes. The basic GIS functions.
8. Raster data in GIS L, Lab - Raster database. Rasterization and pixel operations. Spatial analysis and generalization.
9. GPS (collection and data entry in GIS) L - Using global positioning system (GPS) for the maintenance of graphical database.
10. Digital model of relief, (DMR) L, A - Analysis of relief, methods of making and concrete examples.
11. Integration of data and products of remote sensing in GIS L - Types of remote sensing from space. Digital interpretation of aerial and satellite imagery.
12. Integration of data and products of remote sensing in GIS L, A - Application of remote sensing for the study of natural resources.
13. Data analysis and creation of new information P - Data analysis: spatial analysis, numerical analysis, Development of spatial presentation based on spreadsheet data and numerical analysis.
14. Design of maps, reports for print out P - Creating layout, graphic and tabular content and incorporation into the map. Setting standards, networks and other cartographic map elements. Print to file on paper.
15. Practical application of GIS L, A - Examples of the use of GIS in agro ecology, use and management of natural resources

Obligatory literature

1. Oluić, M.: Photographing And Investigating Earth From Space: satellites, sensors, application. HAZU & Geosat, Zagreb, 516 pages, 2001.
2. Kušan, V.: New techniques in surveying and cartography, Croatian Forests & Faculty of forestry, Zagreb, 1994.
3. Brukner, M. i dr.: GIZIS - basics, INA INFO, Zagreb, 1994.
4. Kereković, D.,: GIS in Croatia, INA - Industrija nafte d.d., Zagreb, 1997.

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Recommended literature

1. http://www.geom.unimelb.edu.au/gisweb/
2. http://www.gisdevelopment.net/tutorials
3. http://www.ccrs.nrcan.gc.ca/ccrs/learn/tutorials