MISKOLCI EGYETEM

MŰSZAKI FÖLD- ÉS KÖRNYEZETTUDOMÁNYI KAR

GEOGRAPHIC INFORMATION SYSTEMS I.

ENVIRONMENTAL ENGINEER MSc

TANTÁRGYI KOMMUNIKÁCIÓS DOSSZIÉ

UNIVERSITY OF MISKOLC
FACULTY OF EARTH AND ENVIRONMENTAL SCIENCES AND ENGINEERING
INSTITUTE OF GEOGRAPHY AND GEOINFORMATICS

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CONTENT

1. COURSE DESCRIPTION

Course Title: Geographic Information Systems I. **Instructor:** Dr. Vágó János	**Code:** MFKHT730012 **Responsible department/institute:** Institute of Geography and Geoinformatics
	Subject status: S
Position in curriculum (which semester): 3.	**Pre-requisites (if any):** -
No. of contact hours per week (lecture + seminar): 2+1	**Type of Assessment (examination/ practical mark / other):** practice mark
Credits: 3	**Course:** full time

The aim of the course:
The aim of the course is to teach the basic knowledge of geographic information system and to give an overview on the most commonly used GIS softwares and application possibilities. The main goal of the course is to teach the use of ESRI ArcGIS. The course covers the tution of both vector and raster based GIS analysis, the geographic data collection, data processing and modeling tools.

Competencies to evolve:
The environmental engineer knows and apply the methodology of environmental informatics, and modeling.
Active professional English language skills.

Course Description:
1. GIS basics, vector and raster format, digital mapping.
2. Vector based data format, setup of GIS databases.
3. Setup and characteristics of geometric data model.
4. Setup and characteristics of semantic data model.
5. Setup and characteristics of metadata.
6. The use of ESRI ArcMAP, data formats.
7. Tools and methods of digitization.
8. Setup of point databases.
9. Setup of polyline databases.
10. Setup of polygon databases.
11. Possibilities of visualization, theamatic mapping.
12. Data analysis, basics of spatial analsyiy.
13. Digital mapping
14. Creation of a pilot project.

Assessment and grading:
Students will be assessed with using the following elements.

Attendance:	50 %
Final exam	50 %
Total	100%

Grading:
> 85%: excellent (5);
75 – 84%: good (4);
63 – 74%: satisfactory (3);
50 – 62%: pass (2);
< 50%: failed (1).

Compulsory or recommended literature resources:
ESRI. 2001. Getting started with ArcGIS. USA
ESRI. 1994. PC Arc/INFO user guides. USA

2. DETAILED COURSE DESCRIPTION

Date	LECTURE
12.09.	Geoinformatics basics, data models, digital mapping.
19.09.	Vector Data Model: Structure, Interpretation of Point, Line, and Polygonal Databases.
26.09.	Structure and components of a GIS database.
03.10.	Structure, characteristics and relationships of a semantic database.
10.10.	Characterization and structure of metadata databases. ESRI software system architecture, data formats.
17.10.	Methods and means of digitalisation.
24.10.	Creating Databases.
31.10.	Educational break.
07.11.	Mid-term exam.
14.11.	Creating line databases.
21.11.	Creating polygon databases.
28.11.	Display options. Basics of data analysis and geoinformatics analysis.
05.12.	Digital map editing. Sample project preparation.
12.12.	Acquiring the practice mark.

Date	SEMINAR
12.09.	Introduction to GIS
19.09.	Getting started: the ArcMap's interface
26.09.	ArcCatalog's functionality and functions
03.10.	Methods of Georeferencing 1
10.10.	Methods for Georeferencing 2
17.10.	Creating and digitizing point files 1
24.10.	Creating and digitizing point files 2
31.10.	Educational break.
07.11.	Creating and digitizing Polyline Files 1
14.11.	Create and digitizing polygon files 1
21.11.	Create and digitizing polygon files 2
28.11.	Simple spatial analysis
05.12.	Thematic presentation options, Layout editing
12.12.	Acquiring practical mark by solving a sample digitizing project

3. SAMPLE MIDTERM EXAM

Questions:

1. Describe the concept of GIS!
2. Which are the major GIS softwares?
3. What are the potential major application areas of the GIS?

Answers:

1.

Definition of GIS: GIS is a tool for storing, managing, composing and displaying spatial information.
We can not regard it as a purely independent discipline for GIS, but - as is apparent from the name - can be interpreted as a complex system that can be divided into many parts and capable of solving many different tasks.
In a more practical approach, we can also define the GIS system as a map based information system that can handle both graphical and non-graphical (descriptive) data in an integrated manner.

2.

- ArcGIS:
    - Is the world's leading geospatial company and its market share is the largest manufacturer of standard formats, such as shp
    - In 1981, GIS software was first launched
    - It is very strong in municipal, educational and business sectors (especially in the logistics area)
    - ArcPAD software can also be installed on field data collection devices.

- MapInfo
    - Since the beginning of the 1990s, it has been marketing GIS software
    - An important player in the business sector, especially in the field of site selection and marketing.
    - Current latest version is MapInfo Pro v17.
- Autodesk
    - The leading CAD manufacturer. Note that although CAD software is also suitable for digital mapping tasks (AutoCAD Map), basically, these products can be used for non-GIS purposes because their analytical functions are limited to

ESRI. (At the same time they are much stronger in the performance of engineering tasks).

- ERDAS/Imagine

  Software for managing and processing raster data layers. It is useful to analyse large satellite imagery.

- QGIS

  With regard to its functionality and structure, it is very similar to ESRI ArcMAP. There is a tremendous benefit of being free of charge against the software listed above! Open source, which makes the GIS evolve and expands its functions. It is a disadvantage that ArcMAP is in the field of analytical functions (for the time being).

3.

In order to increase the yield and cost efficiency in agriculture, the notion of precision agriculture has emerged, which is basically based on the results of GPS mapping, satellite surveys and field mapping based on field data. Knowing the differences in soil properties within the parcels, it is possible to dispense adequate amounts of nutrients, water, and plant protection products.

In the case of industrial operators and production companies, the logistical uses of geospatial logistics (route optimization - within the manufacturing plant, site selection) are also in the focus.

In the service sector, spatial information is used in retail, direct sales - Google, Facebook database-, health, insurance, real estate sales and tourism.

Traditional users are the military and more recently the Disaster Management, where basic, inevitable tools for decision support are various digital geospatial databases.

In the municipalities of local governments and regional development providers, the GIS applications can be found more and more often (ESRI, GisPAN).

4. ASSESSMENT OF PRACTICE MARK

The task is a practical implementation of a project using the ArcMap software, including database building, georeferencing, point, polyline, polygon file creation and digitization of objects, performing simple spatial analysis and displaying results as a thematic map.

5. OTHERS

No other requirements.