MISKOLCI EGYETEM

MŰSZAKI FÖLD- ÉS KÖRNYEZETTUDOMÁNYI KAR

GEODESY, SPATIAL INFORMATICS

HYDROGEOLOGY ENGINEERING (MSc)

SUBJECT COMMUNICATION DOSSIER

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

Miskolc, 2023

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1. COURSE DESCRIPTION

<table>
<tr><td rowspan="2">Course Title: Geodesy, spatial informatics

Instructor: Dr. Gábor Bartha professor emeritus</td><td>Code: MFGGT710002
Responsible department/institute:
Institute of Geography and Geoinformatics</td></tr>
<tr><td>Subject status: Compulsory</td></tr>
<tr><td>Position in curriculum (which semester): 1.</td><td>Pre-requisites (if any): -</td></tr>
<tr><td>No. of contact hours per week (lecture + seminar): 2+1</td><td>Type of Assessment (examination/ practical mark / other): exam</td></tr>
<tr><td>Credits: 4</td><td>Course: full time</td></tr>
<tr><td colspan="2">The aim of the course:
The students will acquire the principles of modern geomatics, its measuring methods and the application of IT in the subject. They will be prepared to apply the modern measuring techniques, the remote data-acquiring methods and use them to solve practical problems. They will learn the application fields of geo-informatics and GIS programs. The students will be competent in the application of modern geodetic technology and geo-informatics in their field. The students enable to process their professional data and organize them into geo-information databases.
Competencies to evolve:
Knowledge: T7
Ability: K2
Attitude: A2
Autonomy and responsibility: F6</td></tr>
<tr><td colspan="2">Course Description:
Coordinate Systems in geodesy. Geometric shape and gravitational field of Earth. Projections and mapping. Hungarian projections and mapping. Modern measuring techniques in Geodesy: Photogrammetry, Remote Sensing, GPS, Inertial Measurements, SAR technology for promoting surveying tasks in the related special fields. Geo-objects and geo-models. Raster and vector models. Data-storing techniques. Database-modelling in geo-informatics. Thematical data and their storage problems. GIS packages. Digitalization, analytical problems, knowledge based systems in GIS environment.
Practical work: self-made solutions of simple case-study problems.</td></tr>
<tr><td colspan="2">Assessment and grading:
Students will be assessed with using the following elements.
Attendance 15 %
Short quizzes 10 %
Midterm exam 40 %
Final exam 35 %
Total 100%
Grading scale:
100 – 85%: excellent (5);
70 – 84%: good (4);
55 – 69%: satisfactory (3);
40 – 54%: pass (2);
0 – 39%: failed (1).</td></tr>
<tr><td colspan="2">Compulsory or recommended literature resources:
Quest: Geodesy Tutorial;
Vanicek, P.: Geodesy;
Burkard, R. K.: Geodesy for the Layman;</td></tr>
</table>

Gábor Bartha: Geoinformation Master Course. University of Miskolc, 2014.
István Havasi - Gábor Bartha: Introduction to GIS, Introduction to Geoinformatics (pp. 10.5) (Gábor Bartha), Satellite Global Positioning Systems (pp. 67) (István Havasi). angol nyelvű digitális tankönyv: **http://digitalisegyetem.uni-miskolc.hu**, Miskolci Egyetem. TÁMOP 4.1.2.-08/1/A-2009-0033 projekt, 2011;
Short, N.: The Remote Sensing Tutorial.

2. Subject schedule

The time marked in red color is a teaching break, the course material to be taught the students at that time will be made up for them after previous discussion with them about the possibilities/date.

2023 Week	**Lecture and Seminar**
1 (14.09.)	Giving information about the subject requirements and special literature. Terminology and target of Geodesy and GIS, and their connections with other sciences. Formation and development of Geodesy and GIS.
2 (21.09.)	Elements of Spatial Information: object, levels, background, geo-object, geo-model spatial information system
3 (28.09.)	Elements of Geodesy: surfaces of Earth, Coordinate systems, Reference ellipsoids, projections (UTM, EOV, Gauss)
4 (05.10.)	Information basics: communication system, bit, Shannon theory, Neumann machine, hardware and software, computer networking (OSI model, Internet, TCP-IP)
5 (12.10.)	Digital image techniques: vector and raster models, image processing, data acquiring.
6 (19.10.)	Database types, relation databases
7 (26.10.)	Concept of Artificial Intelligence, Expert Systems, Direct and Indirect systems
8 (02.11.)	GIS web systems
9 (09.11.)	Connecting GPS - GIS: navigation systems
10 (16.11.)	Having knowledge of GRASS and QGIS programmes. Installation of programmes and basic data sets for the students' computers.
11 (23.11.)	Reviewing and practising the operations performed with GRASS and QGIS.
12 (30.11.)	Reviewing and practising the operations performed with GRASS and QGIS.
13 (07.12.)	Solving the required GIS tasks in small groups.
14 (14.12.)	Evaluation of the students' practical work.

3. SAMPLE TASK FOR THE TERM

Practical task for the 1st semester of the 2023/2024 year
Geodesy, Spatial Informatics (Hydro-geological Engineering MSC)

Open the project "contours" and the "PERMAMENT" map set in the GRASS GIS.

From the "contours" vector file, create the raster topographical map of the area with conversion and interpolation. Save the created map.

On the following tasks use the „Spearfish60" project location. Make an aspect file called „elevation-aspect" from the „elevation.10m", then display that raster file as a base layer. After that place on it the „geology" raster layer with 30% opacity. Save this as an image file.

Draw the raster file called „soils", and divide it into four pieces by dividing the borders into halves, and choose the northwest region. Save the picture from the northwest part. The numbers of the rows and columns should be equal to the original ones, this way we get twice better resolution.

In the report please document the way of the solution (briefly), furthermore need to refer to the names and content of the files.

Please send the project-, and shape files and the report as a word document or a pdf file to the gbmszm@uni-miskolc.hu-mail address, or deliver at the consultation time, or in person.

Please deliver the printed version of the report to the A4/31 (GEODATA) room or to the administration.

Deadline: 16. 11. 2023.

4. MATERIAL OF THE ORAL EXAM (EXAM QUESTIONS)

1. Elements of Spatial Information.
2. Coordinate systems and projections.
3. Information basics: Communication systems, bit, Shannon theory, Neumann machine.
4. Hardware structure and software types.
5. Vector and raster image-models.
6. Elements and structure of Relation Data Bases.
7. Concept, structure and types of Expert Systems.
8. WebGIS and navigation systems.

5. OTHERS

No other requirements.