MODULE INFORMATION SHEET

Name of Module Unit	**Geographic Information Systems**
Name in polish language	Systemy informacji przestrzennej
Module type	compulsory
Form of studying	full-time day courses
Level of study	undergraduate course (B.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environmental Engineering
Responsible department	Chair of Environmental Protection and Management
Responsible person	dr inż. Grzegorz Sinicyn

Semester	Lectures	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
4	15			30		3

Objectives (summary)

Getting the knowledge about the structure, functions and capabilities of the Geographic Information Systems (GIS); about sources of data used in GIS as well as uses of GIS in the engineering and protection of the environment. Getting the ability of usage of the software belonging to the family of GIS (ArcGIS ArcView and MapInfo)

Prerequisites

Basics of informatics and programming; basics of the environmental protection

Rules of integrated grade setting

Average of the grades obtained from the lecture and computer exercises, if necessary grade will be rounded up

Recommended readings

Brimicombe, Allan. „GIS, environmental modelling and engineering”
Chang, Kang-tsung, „Introduction to geographic information systems”
DeMers, Michael N. „Fundamentals of geographic information systems”
Lyon, John Grimson. Red. „GIS for water resources and watershed management”
Maguire, David J. Red. „GIS, spatial analysis, and modeling”
Napoleon, Eileen J. „Thinking spatially using GIS”

Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Basics – definitions and structure of the digital map. Information layer, object and attribute. Models of the spatial data (vector and raster). Introduction to database.	1	S
2	Database – fields and records, database structure, types and properties of fields, calculations and querying of the database. Joining of databases.	1	S
3	Simple and topological vector model.	1	S
4	Raster model of the spatial data. GIS functions based on the raster model. Surface models – vector (isolines, TIN) and raster (DEM), calculations and analyses based on DEM.	2	S
5	TIN format. Data integration: raster – vector conversion, data interoperability.	1	Ex
6	Examples of uses of GIS in the environmental engineering and protection. GIS analyses – operations typical for vector and raster model.	2	S
7	Deterministic and statistical interpolation of spatial data – methods review, results assessment.	1	S
8	Methods of input of the spatial data – digitizing, scanning and calibration.	2	S
9	Basics of the teledetection methods. Navigation systems.	1	Ex
10	Coordinate systems. Polish and European topographic maps.	1	Ex
11	GIS market, history and future of GIS, European standards of the spatial and environmental information.	1	S
12	Test	1	S
	Total	**15**	**hours**

S – topics listed in the legal study programme standards from 12.07.2007
Ex – extended topics

Lecturers

Dr inż. Grzegorz Sinicyn

Assessment method

Test

Contents of computer exercises

	Topics	Time (hrs.)	Scope (S / Ex)
1	Introduction to: exercises, rules of assessment, assigning computer accounts.	2	S
	MapInfo (vector data)		
2	Basics of the work with the map window, review of layers, map composition, data edition, options of display, labels, map scale.	2	S
3	Basics of the work with database: database structure, fields adding	2	S

	and deleting, calculation in database, description layers creation		
4	Spatial data input: creation of a new layer, digitizing from the raster base, raster base calibration, new objects creation	2	S
5	Test – repetition of basics, legend creation. Distributing and describing of the self-studying exercises.	2	S
6	Spatial analyses – selecting objects based on their database attributes, results of map calculations and spatial locations of objects from various layers	2	S
7	Spatial analyses – basics of the joining and cutting of objects. Multilayer calculations.	2	S
8	Spatial analyses – thematic maps as a method for presenting of the non-spatial attributes. Rules of classification. Designing of the maps, tables and charts for printing.	2	S
	ArcGIS (vector and raster maps)		
9	Basics of the work in the ArcGIS environment. Simple and advanced spatial data display.	2	S
10	Database in ArcView: fields adding and deleting, calculation amd querying in database, relating tables.	2	S
11	Declaring and recognizing coordinate systems. Transforming and calibrating of layers.	2	S
12	New layers creation. Setting parameters of the edition session. Creating and editing of the geodatabase.	2	S
13	Spatial analyses – selecting objects based on spatial locations of objects from various layers.	2	S
14	Advanced spatial analyses – new data creation, multilayer analyses.	2	S
15	Introduction of the raster model. Raster and DEM analyses.	2	S
	Total	**30**	**hours**

S – topics listed in the legal study programme standards from 12.07.2007
Ex – extended topics

Persons responsible for computer exercises

Dr inż. Dorota Pusłowska-Tyszewska, Dr inż. Grzegorz Sinicyn, mgr inż. Maria Grodzka-Łukaszewska

Assessment method for computer exercises

Presence on the exercises. Completion of the tests, proper solution of the tasks and correct presentation of their results. The final grade is the average of all the grades obtained during the semester. Both parts of the exercises (Map Info and ArcGIS) must be completed by a student.