MODULE INFORMATION SHEET

Name of Module Unit	**Spatial Data Analysis**
Name in polish language	Analiza danych przestrzennych
Module type	compulsory
Form of studying	full-time day courses
Level of study	graduate course (MSc level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environmental Protection Engineering
Responsible department	Chair of Environmental Protection and Management
Responsible person	dr inż. Grzegorz Sinicyn

Semester	Lectures	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
2	15			30		3

Objectives (summary)

The role of spatial information in environmental protection engineering. Geographic Information Systems (GIS) – the tool for managing spatial data. Sources of data used in the engineering and protection of the environment. Data manipulating – formats, integration, conversion, interpolation. Data analysis – visualisation, calculations, new data creation, multilayer analyses. Vector and raster representations of spatial data.

Prerequisites

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.)
1	Spatial information in environmental protection engineering. Vector and raster representations (models) of spatial data. Digital maps, information layers, objects. Attributes of spatial data. Simple and topological vector models.	2
2	Database – fields and records, database structure, types and properties of fields, calculations and querying of the database. Joining of databases. Methods of input of the spatial data – digitizing, scanning and calibration.	2
3	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
4	Deterministic and statistical interpolation of spatial data – methods review, results assessment. Advantages and disadvantages of interpolation methods.	2
5	Advanced spatial analysis for vector models.	2
6	Advanced spatial analysis for raster models.	2
7	Examples of uses of GIS in the environmental engineering and protection. GIS analyses – operations typical for vector and raster model. Review of available software.	1
8	Test	2
	Total	**15**

Lecturers

dr inż. Grzegorz Sinicyn

Assessment method

Test

Contents of computer exercises

	Topics	Time (hrs.)
1	Introduction to: exercises, rules of assessment, assigning computer accounts. Basics of the work in the GIS environment. Simple and advanced spatial data display.	2
2	Database in GIS: fields adding and deleting, calculation and querying in database, relating tables.	2
3	Declaring and recognizing coordinate systems. Transforming and calibrating of layers.	2
4	Point layers. Creating a layer based on a file, editing a point layer, creating a new point layer.	2
5	Line layers. Creating a new linear layer based on the topographic map.	2
6	Polygon layers. Creating a new polygon layer based on the topographic map.	2
7	Spatial analysis in GIS. Overview of spatial functions. The use of spatial analysis functions. Buffering.	2
8	Spatial joins. Dissolving the boundaries between objects. Clipping vector layers. Joining vector layers. Overlapping and intersection of vector layers.	2

9	Raster spatial analysis. Displaying raster data. Conversion of floating-point grids to integer grids. Reclassification. Conversion between vector and raster format. *NoData* cells in raster maps. Creating grid from a text file.	2
10	Digital elevation model (DEM). Local, zonal and neighborhood (focal) functions. Map of distance and proximity, analysis mask. Determining the route with the minimal cost.	2
11	Interpolation. Creating DEM. DEM analysis - exposure, slope, visibility, hydrological functions.	2
12	Finding areas suitable for the location of a landfill fulfilling certain requirements.	2
13	Guided revision of the course material.	2
14	Test	4
	Total	**30**

Persons responsible for computer exercises

dr inż. Maria Grodzka-Łukaszewska

Assessment method for computer exercises

Presence on the exercises. Completion of the test, proper solution of the tasks and correct presentation of their results.