Course description

Department/Unit /	KGM / APA-E			**Academic Year**	2023/2024
Title	Algorithms of Spatial Analyses			**Type of completion**	Exam
Accredited/Credits	Yes, 3 Cred.			**Type of completion**	Combined
Number of hours	Lecture 1 [Hours/Week] Tutorial 2 [Hours/Week]				
Occ/max	Status A	Status B	Status C	**Course credit prior to**	YES
Summer semester	0 / -	0 / -	0 / -	**Counted into average**	YES
Winter semester	0 / -	0 / -	0 / -	**Min. (B+C) students**	1
Timetable	Yes			**Repeated registration**	NO
Language of instruction	English			**Semester taught**	Summer semester
Optional course	Yes			**Internship duration**	0
Evaluation scale	1|2|3|4			**Ev. sc. – cred.**	S|N
No. of hours of on-premise					
Auto acc. of credit	No				
Periodicity	K				
Substituted course	None				
Preclusive courses	KGM/APA				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	N/A				

Course objectives:

The goal of the subject is to present to students following topics: Symbolizing spatial analyses. Algorithms of digital elevation model creation. Computing continuous surfaces directly from vector data. Spatial statistics methods. Selected spatial analyses. Spatial modeling. Knowledge about geographic information systems equal to subject KMA/UGI is expected.

Requirements on student

Student has to follow the study plan, which is setup at the beginnig of the semester. Student has to deliver a semestral work, and pass the final exam consisting of three parts: theoretical test, practical work with a GIS package, academic discussion.

Content

Introduction, terminology.
Symbolic coding of spatial analyses.
Programming languages for spatial analyses.
Algorithms of digital terrain model creation.
Interpolation of rasters.
Raster analysis.
Graphs and spatial models.
Spatial modelling.

Fields of study

Guarantors and lecturers

- **Guarantors:** Ing. Karel Jedlička, Ph.D.

Literature

- **Basic:** Longley, Paul A. *Geographic information systems and science*. Chichester : John Wiley & Sons, Ltd., 2001. ISBN 0-471-89275-0.
- **Basic:** Burrough, Peter A.; McDonnell, Rachael A. *Principles of geographical information systems*. 1st ed. repr. Oxford : Oxford University Press, 1998. ISBN 0-19-823365-5.
- **Recommended:** Maidment, David R. *Arc Hydro : GIS for water resources ; David R. Maidment, editor*. Redlands : ESRI Press, 2002. ISBN 1-58948-034-1.
- **Recommended:** Montgomery, D. R. *Hydrological applications of GIS : Edited by A. M. Gurnell, D. R. Montgomery*. Chichester : John Wiley and Sons, 2001. ISBN 0-471-89876-7.
- **Recommended:** Neteler, Markus; Mitasova, Helena. *Open source GIS : a GRASS GIS approach*. 2nd ed. Boston : Kluwer Academic Publishers, 2004. ISBN 1-4020-8064-6.
- **Recommended:** Fortheringham, A. Stewart; Wegener, Michael. *Spatial models and GIS : new potential and new models ; Ed. by A. Stewart Fortheringham, Michael Wegener*. London : Taylor & Francis, 2001. ISBN 0-748-40846-0.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Contact hours	39
Graduate study programme term essay (40-50)	29
Preparation for an examination (30-60)	30
Presentation preparation (report) (1-10)	5
Total:	**103**

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

Oral exam

Written exam

Practical exam

Skills - skills achieved by taking this course are verified by the following means:

Seminar work

Group presentation at a seminar

Practical exam

Competences - competence achieved by taking this course are verified by the following means:

Seminar work

Individual presentation at a seminar

Written exam

Oral exam

prerequisite

Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:

explain fundaments of GIS

explain fundaments of databases

explain concepts of vector and raster data

explain, how character and accuracy of geographic data depends on its source

Skills - students are expected to possess the following skills before the course commences to finish it successfully:

acquire geographical data from available sources

store geographic data to a data base

use at least one GIS package at an entry level

be able to turn description of a geographical problem into a workflow solving the problem

Competences - students are expected to possess the following competences before the course commences to finish it successfully:

N/A

N/A

N/A

N/A

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

Lecture with visual aids

Interactive lecture

Lecture supplemented with a discussion

Task-based study method

Multimedia supported teaching

Skills - the following training methods are used to achieve the required skills:

Practicum

Skills demonstration

Task-based study method

Cooperative instruction

Competences - the following training methods are used to achieve the required competences:

Skills demonstration

Practicum

Project-based instruction

Textual studies

learning outcomes

Knowledge - knowledge resulting from the course:

define basic terms of Systems theory

explain principles of fundamental analytical functions of geographic information systems

explain the difference of working with GIS through GUI and through API

solving geographically based problems together with an expert of an application domain (e.g. transport, ecology, hydrology, etc.)

Skills - skills resulting from the course:

Create a model of analytical solution of a geographically determined problem

master the principles of geographic analysis automation

access an API of a selected geographic information system

explain GIS principles to expert from different domain (e.g. transport, ecology, hydrology, etc.)

Competences - competences resulting from the course:

N/A

N/A

N/A

N/A

Course is included in study programmes: