Course description

Course abbreviation:	KGM/PDB	**Page:**	1 / 4
Course name:	Spatial Databases		
Academic Year:	2023/2024	**Printed:**	03.06.2024 10:10

Department/Unit /	KGM / PDB			**Academic Year**	2023/2024
Title	Spatial Databases			**Type of completion**	Exam
Accredited/Credits	Yes, 4 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	1 / -	7 / -	2 / -	**Min. (B+C) students**	1
Timetable	Yes			**Repeated registration**	NO
Language of instruction	Czech			**Semester taught**	Winter 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	Yes in the case of a previous evaluation 4 nebo nic.				
Periodicity	K				
Substituted course	KMA/PDB				
Preclusive courses	KGM/PDB-E				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	KIV/ISSZ				

Course objectives:

The main aim of this subject is to introduce the main principles of spatial databases. In particular the followings themes: Data structures for spatial data indexing. Algorithms of spatial databases. Spatial join in spatial queries. Spatial objects and SQL - Abstract Data Types. Data modelling in spatial databases (conceptual, logical and physical data model). Strategies and techniques for data conversion. Commercial and open source solutions.

Requirements on student

Students have to do semestral work to obtain credit. Next they have to present this work. The exam has two parts ? written and oral. Students have to obtain minimally 60% of all points in written test. Than the oral part of exam will follow.

Content

1. Introduction to spatial databases. Definition of the main terms.
2. Spatial data representation formats.
3. Query language for spatial data.
4. Modelling of spatial data with constraints.
5. Algorithms of spatial databases.
6. Data structures for spatial data indexing.
7. Spatial queries and spatial join.
8. Commercial and open source solutions for spatial data handling.

Fields of study

Studentům jsou k dispozici studijní opory v elektronické formě.

Guarantors and lecturers

- **Guarantors:** Doc. Ing. Karel Janečka, Ph.D. (100%)
- **Lecturer:** Doc. Ing. Karel Janečka, Ph.D. (100%), Ing. Karel Jedlička, Ph.D. (100%)
- **Tutorial lecturer:** Doc. Ing. Karel Janečka, Ph.D. (100%), Ing. Karel Jedlička, Ph.D. (100%)

Literature

- **Basic:** Claramunt, C., Schneider, M., Wong, R.C.-W., Xiong, L., Loh, W.-K., Shahabi, C., Li, K.-J. *Advances in Spatial and Temporal Databases*. Hong Kong, China, 2015. ISBN 3319223623.
- **Basic:** Arctur, David; Zeiler, Michael. *Designing geodatabases : case studies in GIS data modeling*. Redlands : ESRI Press, 2004. ISBN 1-58948-021-X.
- **Basic:** Shekhar, Shashi; Chawla, Sanjay. *Spatial databases : a tour*. Upper Saddle River : Prentice Hall, 2003. ISBN 0-13-017480-7.
- **Basic:** Rigaux, Philippe; Scholl, Michel; Voisard, Agn?s. *Spatial databases : with applications to GIS*. San Francisco : Morgan Kaufmann Publishers, 2002. ISBN 1-55860-588-6.
- **Basic:** Janecka, K., Karki, S., van Oosterom, P., Zlatanova, S, Kalantari, M., Ghawana, T. *3D Spatial DBMS for 3D Cadastres*. Copenhagen, Denmark, 2018. ISBN 978-87-92853-64-6.
- **Recommended:** Beinat, Euro; Godfrind, Albert; Kothuri V, Ravikanth. *Pro Oracle Spatial*. Apress, 2004. ISBN 1-59059-383-9.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Contact hours	39
Presentation preparation (report) (1-10)	1
Preparation for an examination (30-60)	30
Individual project (40)	40
Total:	**110**

assessment methods

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

Seminar work

Individual presentation at a seminar

Written exam

Practical exam

Oral exam

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

Seminar work

Individual presentation at a seminar

Oral exam

Written exam

Practical exam

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

Seminar work

Individual presentation at a seminar

Written exam

Practical exam

Oral exam

prerequisite

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

to describe the possibilities of representations of geographical data in the digital form

to describe the basic database objects of relational databases

to describe the differences between a conceptual, a logical and a physical data model

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

to write a simple SQL DML query

to propose a conceptual, a logical and a physical data model of the relational database

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

N/A

teaching methods

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

Lecture supplemented with a discussion

Task-based study method

Skills demonstration

Collaborative instruction

Individual study

Students' portfolio

One-to-One tutorial

Interactive lecture

Discussion

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

Lecture

Lecture with visual aids

Practicum

Task-based study method

Textual studies

Skills demonstration

Students' portfolio

Collaborative instruction

One-to-One tutorial

Discussion

Individual study

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

Textual studies

Task-based study method

Individual study

Students' portfolio

Discussion

learning outcomes

Knowledge - knowledge resulting from the course:

to describe the basic differences between a relational- and a spatial- database

to characterise the basic properties of a data model for spatial data according to the ISO 19125

to explain the principles of selected data structures for spatial data indexing

to propose a usage of an appropriate algorithm for selected task from the field of spatial databases

to explain the principles of a spatial join

Skills - skills resulting from the course:

to propose a conceptual and a logical data model for storage of spatial data

to describe the proposed data model by the means of UML

to propose the suitable spatial data types for a physical data model

to implement the physical data model in selected database managament system with a spatial option (Oracle Spatial, PostGIS, ESRI Geodatabase)

Competences - competences resulting from the course:

N/A

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Geomatics	Postgraduate Master	Full-time	Geoinformatika	1	2023 akr	2023	Povinné předměty - specializace	A	1	ZS
Geomatics	Postgraduate Master	Full-time	Zeměměřictví a katastr nemovitostí	1	2023 akr	2023	Povinné předměty - specializace	A	2	ZS
Geomatics	Postgraduate Master	Full-time	Geomatics	1	2020	2023	Povinné předměty specializační	A	1	ZS
Geomatics	Postgraduate Master	Full-time	Geomatics	1	2020	2023	Povinné předměty specializační	A	1	ZS
Civil Engineering	Bachelor	Full-time	Land-use Planning	1	2017	2023	Povinně volitelné předměty	B	4	ZS
Civil Engineering	Bachelor	Full-time	Land-use Planning	1	2020	2023	Povinně volitelné předměty	B	4	ZS
Computer Science and Engineering	Postgraduate Master	Full-time	Computer Graphics	1	2018	2023	Povinně volitelné předměty	B	2	ZS
Geomatics	Postgraduate Master	Full-time	Geomatics	1	2020	2023	Povinně volitelné předměty specializační	B	2	ZS
Informatika a její specializace	Postgraduate Master	Full-time	Počítačová grafika	1	2022 akr	2023	Povinně volitelné předměty specializační	B	2	ZS
Softwarové a informační systémy	Postgraduate Master	Full-time	Softwarové a informační systémy	1	2022 akr	2023	Profilující základ	B	2	ZS