RTU Course "Advanced data technologies"

12307 Sistēmu teorijas un projektēšanas katedra

General data

Code	DSP708
Course title	Advanced data technologies
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Computer Science
Responsible instructor	Jānis Eiduks
Academic staff	Egons Lavendelis
Volume of the course: parts and credits points	1 part, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, EN
Possibility of distance learning	Not planned
Abstract	Database is a backbone an information system. There is a large variety of information systems, therefore different types of database data models, query languages and architectures are needed. In this course the following advanced data models are discussed: - object database models; - multidimensional database models; - temporal database models; - active database models; - multimedia database models; - deductive database models; - intelligent database models. In the course above-mentioned models are combined with well-known and very wide used relational database models. The course includes main groups of query languages used in advanced database systems, such as SQL and its object and temporal extensions; multidimensional query languages for data warehousing systems and artificial intelligence languages. The course concerns also issues on information systems architecture for large variety of possibilities to organize storing, searching and presenting data, information and knowledge: different client/server architectures with application servers and web servers, distributed database architectures and multibase architectures. Databases are not only for data storage and retrieval, they can perform different algorithms to provide needed information and knowledge. To illustrate this database capability deductive databases, data mining, and intelligent databases are considered.
Goals and objectives of the course in terms of competences and skills	The main objectives of the course are to provide knowledge and/or skills in: - the newest directions in databases data models; - discovering advantages and disadvantages of database data models; - handling advanced methods of data storage in different databases; - recognizing and using searching possibilities in different databases; - information searching in different databases; - retrieving knowledge from different databases; - recognizing, designing, and using different database systems architectures and their possibilities; - using database systems evaluation criteria.
Structure and tasks of independent studies	Theoretical work is combined with practical assignments: designing different databases structures, realizations of examples for data searching algorithms, realization of examples for data mining algorithms and working with commercial and prototype advanced database systems.
Recommended literature	IBM Academic Innitiative materials https://www.ibm.com/developerworks/university/courseware/; C.J. Date An Introduction to Database Systems, 8th ed, Addison Wiley, 2004. W.H. Inmon Building Data Warehouse, 3rd ed., John Wiley and Sons, 2002.
Course prerequisites	Basic knowledge in databases

Course outline

Theme	Hours
Universal database systems: relational and object-relational databases.	8
Temporal database systems: conceptual and logical models.	8
Data retrieval form temporal database systems.	8
Spatial database systems: conceptual and logical models.	8
Data retrieval from spatial databases.	8
Active database systems: active rules and their implementation.	8
Deductive database systems: use of rules in database.	8
Multidimensional database systems: conceptual and logical models.	4
Database systems for semi-structured data: conceptual models and logical models.	4

Learning outcomes and assessment

Learning outcomes	Assessment methods
Master different types of universal database extensions, their logical models.	Questions at the final examination.
Can design universal, temporal, spatial, deductive, multidimensional, and semi-structured database systems.	Accomplished laboratory assignments, examination questions.
Know how to ensure data quality.	Questions at the final examination.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	4.0	6.0	2.0	0.0	2.0		*	