RTU Course "Advanced data technologies"

33000 Datorzinātnes, informācijas tehnoloģijas un enerģētikas fakultāte

General data

Code	DE0745
Course title	Advanced data technologies
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Ilze Andersone
Academic staff	Ilze Birzniece Jānis Eiduks Ainārs Auziņš Māra Romanovska
Volume of the course: parts and credits points	1 part6.0 ECTS credits
Language of instruction	LV, EN
Abstract	Adequate technology is needed to implement effective data storage and retrieval. The study course deals with different types of database systems (relational, relational-object and data warehouses) and their temporal, deductive and active extensions. The study course includes the practical use of the structured query language SQL and its various extensions for various database systems. In order for a specialist to be able to independently create or order a data storage solution corresponding to the company's information system, the study course also includes database design and implementation technologies. Students are introduced to information systems and database technology architectures. In the practical part of the study course, various types of databases are designed and data insertion, retrieval and processing and quality analysis are performed.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to acquaint students with the technologies of using Database (DB) system extensions (DB kernel extensions, included procedures and software packages). The task of the study course is to provide knowledge about the advantages of the following DB systems: 1. Design and implementation of geometric or spatial data DB system extension. 2. Design and implementation of temporal data DB system extension. 3. Design and implementation of multidimensional data DB system extension. 4. Design and implementation of active and deductive DB system extension. 5. Design and implementation of semi-structured data DB system extension.
Structure and tasks of independent studies	The knowledge gained in lectures is strengthened and improved in practical work. Practical works also give students an idea of the real possibilities of the systems used. During the study course students must complete 4 practical works. 1. Create a database and execute queries focused on using extended SQL functions and data analysis. An evaluation of the results obtained must be carried out. 2. Create a graphical example to be entered into the graphical database. The definition of the graphical data storage structure must be implemented, data must be entered. The results of the entered data must be checked. 3. Execute graphical queries. The results obtained must be analysed and justified. 4. Create a Multidimensional Data DB system, enter data. Analytical queries must be implemented in Multidimensional DB. An evaluation of the results obtained must be carried out. Practical tasks are mandatory.
Recommended literature	1. Obligatā. / Obligatory 2. Date, C. J.. An introduction to database systems / C.J. Date Boston (MA) ... [etc.] : Pearson/Addison Wesley, c2004., xxvii, 983, [22] lpp. : il. ; 24 cm. 3. Silberschatz, Abraham. Database system concepts / Abraham Silberschatz, Henry F. Korth, S. Sudarshan., xxviii, 1344 lpp. : shēmas, tabulas ; 24 cm 4. Gerardus Blokdyk. . Spatial Database a Complete Guide - 2020 Edition Emereo Pty Limited, 2020. Papildu. / Additional 1. Albert K.W. Yeung, G. Brent Hall.. Spatial Database Systems: Design, Implementation and Project Management. Springer, 2007. 2. Rigaux P., Scholl M., Voisard A. . Spatial Databases. With Application to GIS Morgan Kaufmann Publishers, 2002. 3. Kimball R., Ross M., Becker B. . Kimball's Data Warehouse Toolkit Classics, 3 Volume Set Wiley, 2014. 4. Inmon W.H. . Building the Data Warehouse, 4th edition. Wiley, 2005. 5. Luger G.F. Artificial intelligence.. Structures and strategies for Complex Problem Solving. 6th edition. Addison Wesley, 2008. 6. Bertino E., Zarri G.P. . Intelligent Database Systems Addison-Wesley, 2001.
Course prerequisites	Algebra of relations and objects; predicate invoices; logic programming; data structures and algorithms; basics of database technology; relational and relational-object database systems; basic concepts of artificial intelligence; logic programming; basic concepts and methods of information systems design.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Universal database systems: relational and object-relational databases.	8	10	0	0
Temporal database systems: conceptual and logical models.	8	10	0	0
Data retrieval form temporal database systems.	8	10	0	0

Spatial database systems: conceptual and logical models.	8	12	0	0
Data retrieval from spatial databases.	8	12	0	0
Active database systems: active rules and their implementation.	8	10	0	0
Deductive database systems: use of rules in database.	8	10	0	0
Multidimensional database systems: conceptual and logical models.	4	12	0	0
Database systems for semi-structured data: conceptual models and logical models.	4	10	0	0
Total:	64	96	0	0

Learning outcomes and assessment

Learning outcomes	Learning outcomes assessment methods and assessment criteria
Is able to design and implement a spatial database.	Practical work, relevant questions in the semester test and exam.
Understands temporal databases and is able to design and implement them.	Practical work, relevant questions in the semester test and exam.
Understands deductive databases and is able to develop them.	Practical work, relevant questions in the semester test and exam.
Understands active database technologies and is able to develop an active database.	Practical work, relevant questions in the semester test and exam.
Is able to design and implement data warehouses.	Practical work, relevant questions in the semester test and exam.
Is able to create semi-structured data DB using XML language.	Practical work, relevant questions in the semester test and exam.

Course tests

Tests	% of final assessment
Average grade for all practical work. The student receives the minimum grade (4) if the assignment scores 50%. The minimum requirements vary depending on the assignments.	60
TheStudent's theoretical knowledge and practical skills are tested in the semester tests. The student receives minimum passing grade (4) on 50% of the points.	20
The final exam tests the student's theoretical knowledge and practical skills of the student. The student must receive minimum passing grade (4) at 50% of the points.	20
Total:	100

Course planning

Part	Semester			CP	Academic hours			Tests		
	Autumn	Spring	Summer		Lectures	Practical	Lab.	Test	Exam	Work
1.	*			6.0	32.0	0.0	32.0		*	