

Study programme(s): Informatics (IM)	
Level: master	
Course title: Software engineering for database systems (code IB231)	
Lecturer: Miloš D. Racković	
Status: obligatory for the Information technologies module; elective for other modules.	
ECTS: 7,5	
Requirements: None	
Learning objectives To provide students with the theoretical basis for understanding the modern services for database management systems (DBMS) and their integration in the information systems. The systematic approach to practical implementation of the software application that uses database is stimulated.	
Learning outcomes <i>Minimal:</i> Students should be able to demonstrate understanding of the various database management systems (DBMS) and their characteristics. Furthermore, students should be able to estimate the need and different options for integrating database, as well as to actively participate in the implementation of the chosen case studies. <i>Optimal:</i> Students should be able to critically verify different database management systems (DBMS) and their characteristics, and capable of complete implementation of the chosen case study.	
Syllabus <i>Theoretical instruction</i> Theoretical basis of the database taxonomy, models and architectures of the database management systems (DBMS), the database aspects (relational, procedural, object-oriented, descriptive (XML), deductive), database integrity, database integration: language-oriented (built-in SQL), operation-oriented (ODBC, JDBC), component-based, SOA, and case-based integration. Introduction to basic principles and concepts of the object-relational mapping (ORM) of application's data layer object model to relational database model. The techniques of mapping of the all object-oriented concepts to tables and relationships in a relational database. <i>Practical instruction</i> Introduction to the EJB3 framework with the emphasis on the JPA part of the framework. JPA is ORM part of EJB3 framework and it is responsible for the persistence of data in the database. Demonstration of using JPA interfaces as well as practicing through examples. Several example applications are made using EJB3 framework. Eclipse IDE is used as a development environment for applications, JBoss Application Server is used to run applications and MySQL database is used for storing data. At the end of the practical instructions, students choose an example application that they have to develop independently, and document it in the form of the seminar paper.	
Literature 1. Raghu Ramakrishnan, Johannes Gehrke, <i>Database Management Systems</i> , McGraw-Hill Science/Engineering/Math; 3th edition, 2002. 2. Jan L. Harrington, <i>Object-Oriented Database Design Clearly Explained</i> , Morgan Kaufmann, 1999 3. Akmal B. Chaudhri, Awais Rashid, Roberto Zicari, <i>XML Data Management: Native XML and XML-Enabled Database Systems</i> , Addison-Wesley Professional, 2003 4. Debu Panda, Reza Rahman, Derek Lane, <i>EJB 3 in Action</i> , Manning, 2007	
Weekly teaching load	Other:

Lectures: 3	Exercises: 2	Other forms of teaching:	Student research:	
Teaching methodology The methods used on the lectures are classical teaching methods including the use of a video beam. The classical teaching methods including video beam are also used in exercises for analysing the case studies. Through practical work on computers, students are introduced with the tools and software environment necessary for application development, and have the task to develop a few example applications by using them. Moreover, independently of the classes, students develop an application which they chose, and document it in the form of the seminar paper.				
Grading (maximum number of points 100)				
Pre-exam obligations	points	Final exam	points	
Seminar work	70	oral exam	30	