

## Specification for the book of courses

<b>Study program</b>		Computing and Informatics		
<b>Module</b>		Software Engineering		
<b>Type and level of studies</b>		Master studies		
<b>The name of the course</b>		Database Management Systems		
<b>Lecturer (for lectures)</b>		Stoimenov V. Leonid, Stanimirović S. Aleksandar		
<b>Lecturer/associate (for exercises)</b>		Stanimirović S. Aleksandar		
<b>Lecturer/associate (for OFE)</b>				
<b>Number of ECTS</b>	4	<b>Course status (obligatory/elective)</b>	Elective	
<b>Prerequisites</b>				
<b>Course objectives</b>	Obtaining knowledge about basic concepts and principles of database management systems (DBMS) and their components. Obtaining knowledge on advanced DBMS usage techniques (triggers, security, query optimization). Obtaining knowledge on basic concepts and principles of advanced database systems functioning.			
<b>Course outcomes</b>	Theoretical knowledge on DBMSs, their components and usage patterns; practical knowledge on advanced DBMS usage techniques, administration, performance tuning and data maintenance.			
<b>Course outline</b>				
<b>Theoretical teaching</b>	Introduction to database management systems (DBMS). The role and responsibilities of database administrator. Database management system: architecture, basic modules and functions, examples of such systems. Physical database design and tuning. Stored procedures. Triggers: term, purpose and trigger usage, syntax of command for creating trigger, trigger types and granularity, row level and expression level triggers, timetable of trigger executions. Query processing and optimization: the term of query optimization, static and dynamical optimization, system catalogue, database statistics and optimization, index structures and multidimensional indices. DBMS security: the term of DBMS security, user privileges - assigning and deprivation (GRANT and REVOKE commands), privileges propagation, security at view level, statistical databases, DAC and MAC security mechanisms. Database recovery. Modern DBMS trends: cloud databases, distributed databases and big data.			
<b>Practical teaching (exercises, OFE, study and research)</b>	The role of database administrator, practical usage of DBMS and administration tools - practical examples and tasks. Database performance tuning, indices creation. Query optimization - practical examples, problems, DBMS tools utilization. DBMS security and role of database administrator, security on operating system level, network level, hardware level etc. - practical examples and tasks. Modern DBMS challenges and example of new technologies utilization and tools.			
<b>Textbooks/references</b>				
1	R. Emasri, S. Navathe, Fundamentals of Database Systems, Pearson; 7 edition (2016), ISBN-13: 9780133970777			
2	R. Ramakrishnan, J. Gehrke, Database Management Systems, Third Edition, 2002, ISBN-13: 978-0072465631, McGraw-Hill.			
3	T. M. Conolly, C. E. Begg, Database Systems: A Practical Approach to Design, Implementation and Management, 5th edition, 2009			
4				
5				
<b>Number of classes of active education per week during semester/trimester/year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>OFE</b>	<b>Study and research work</b>	<b>Other classes</b>
2	1	0		
<b>Teaching methods</b>	Lectures, laboratory exercises, laboratory sessions, students work on assignments and projects, student seminars.			
<b>Grade (maximum number of points 100)</b>				
<b>Pre-exam duties</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>	
<b>Activity during lectures</b>	30	<b>Written exam</b>		
<b>Exercises</b>	30	<b>Oral exam</b>	40	
<b>Colloquia</b>				

Projects			