Specification for the book of courses

Study program		Electrical Engineering and Computer Science	
Module		Computing and Informatics	
Type and level of studies		Undergraduate Academic Studies	
The name of the course		Data Structures	
Lecturer (for lectures)		Stoimenov V. Leonid, Bogdanović D. Miloš	
Lecturer/associate (for exercises)		Dimitrijević M. Aleksandar, Mihajlović T. Vladan, Davidović P. Nikola	
Lecturer/associate (for OFE)		Dimitrijević M. Aleksandar, Mihajlović T. Vladan, Davidović P. Nikola, Veljanovski T. Marija	
Number of ECTS	6	**Course status (obligatory/elective)**	Obligatory

Prerequisites	
Course objectives	Obtaining knowledge on basic concepts of fundamental data structures, as well as the knowledge needed for designing, implementing and using data structures in order to design effective algorithms for solving specific problems. The aim is for students to become familiar with abstract data structures, memory representations of data structures and basic operations. Also, the goal for students is to reach knowledge necessary for the design, implementation and use of basic data structures for solving specific problems in the selected programming language.
Course outcomes	Teoretical and practical knowledge on abstract data structures, memory representation and operations. Pratical knowledge about concepts, internal design and implementation of fundamental data structures in programming languages C/C++ and Java.
Course outline	
Theoretical teaching	1. Introduction: Definition and overview of data structures; data structures in software engineering; pseudocod; complexity of algorithms 2. Arrays: array definition, array operations, string data types, sequential and binary search, sorting. 3. String and string data type. Definitions of string, operations, searching in strings and text serch algorithms. 4. Linked lists: structure definition, linked lists' types - single linked, double linked, cyclical; operations (traversal, addition, deletion), statical and dynamical linked lists' implementation 5. Queue, Steck, Deck: structure definiton, statical and dynamical implementation of queue, steck and deck, basic operations (traversal, addition, deletion) 6. Hash tables: structure definiton, term definitions (hash function, collision, synonims), collision resolution (open addressing, linking synonims), hash table implementation, basic operations 7. Trees: basic terms, general and binary trees, basic operations (traversal, addition, deletion), ordered binary trees, statical and dynamical implementation, Heap, search trees, B, B*, B++ trees. 8. Graphs: term definitions, statical (adjacency matrix and incidence matrix) and dynamical graph representation (linked structures), operations for statical and dynamical implementation, graph traversals: depth-first search and breadth-first search, shortest path in graph 9. Datafiles: sequential, index-sequential, index-unsequential, multiple keys datafiles.
Practical teaching (exercises, OFE, study and research work)	1. Introduction: Development framework and preparation for practical tasks 2. Arrays and strings: implementation of arrays using one of proposed programming languages, sorting and searching. 3. Linked lists: Linked lists implementation, statical and dynamical implementation 4. Queue, Steck, Deck: Queue, steck and deck implementation 5. Hash tables: Hash tables implementation 6. Trees: Tree implementation, implementation of special types of trees 7. Graphs: Graph implementation, statical and dynamical implementation, graph operations, shortest path in graph
Textbooks/references	
1	M.T.Goodrich, R.Tamassia, D. Mount, Data Structures and Algorithms in C++, John Wiley, 2004, ISBN 0-471-42924-4
2	S. Djordjevic-Kajan, L. Stoimenov, A. Dimitrijević, Labwork preparation for Data Structures and Databases, I part: DATA STRUCTURES: C/C++, ISBN 86-85195-02-0, 2005, Electronic Faculty in Nis
3	S. Djordjevic-Kajan, L. Stoimenov, A. Dimitrijević, Labwork preparation for Data Structures and Databases, I part: DATA STRUCTURES: Java, ISBN 86-80135-90-9, 2004, Faculty of Electronic Engineering Nis

4	M. Tomasević,Algorithms and Data Structures, Akademska Misao, 2008, ISBN 978-86-7466-328-8			
5	A. Drozdek, Data Structures and Algorithms in Java, Brooks Cole, 2001,ISBN 0-534-37668-1			
Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
2	2	1	0	0
Teaching methods	Lectures, laboratory exercises, laboratory sessions, students work on assignments and projects, student seminars.			
Grade (maximum number of points 100)				
Pre-exam duties		**Points**	**Final exam**	**Points**
Activity during lectures			**Written exam**	
Exercises		20	**Oral exam**	40
Colloquia		40		
Projects				