RĪGAS TEHNISKĀ UNIVERSITĀTE

RTU Course "Data Structures"

02C60 null

General data

Code	BS0013
Course title	Data Structures
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Jānis Lazovskis
Academic staff	Kalvis Apsītis
Volume of the course: parts and credits points	1 part, 7.0 credits
Language of instruction	EN
Annotation	The study course provides a rigorous analysis of the design, implementation, and properties of advanced data structures. Topics include time-space analysis and trade-offs in arrays, vectors, lists, stacks, queues, and heaps; tree and graph algorithms and traversals, hashing, sorting, and data structures on secondary storage. The study course surveys library implementations of basic data structures in a high-level language. Advanced data structure implementations are studied in detail. The study course illustrates the importance of choosing appropriate data structures when solving a problem by programming projects in a high-level programming language.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to provide knowledge about the structures of basic data and their implementation. The tasks of the study course are: - to acquaint with graphs and trees, their numerical invariants and their applications; - to teach to recognize and create fundamental data structures and fundamental algorithms; - to develop the ability to apply different declarations and object types; - to improve abstraction capabilities in creating algorithms and data types.
Structure and tasks of independent studies	Students independently analyse the study course literature, prepare for practical and test works, exam, do homework and assignments.
Recommended literature	Obligātā/Obligatory: Michael T. Goodrich, Roberto Tamassia, David M. Mount, Data Structures and Algorithms in C++, ISBN 978-0-470-38327-8, February 2011. Paperback, 736 p. E. Horowitz & Sahni, Fundamental Data Structure, Galgotia Book Source, 1983, 501 p. A. Tannenbaum, Data Structure Using C, Pearson Education, 2003, 662 p. T. Kruz, Data Structure and Programming Design, 1987, 734 p. N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979, 366 p.
Course prerequisites	Introduction to Computer Science and College Calculus.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Programming language C++.	15	15	0	0
Asymptotic notations, solving recurrences, sorting.	15	15	0	0
Recursion and iteration.	15	15	0	0
Lists, stacks, queues, deques.	15	15	0	0
Priority queues.	10	10	0	0
Trees.	10	10	0	0
Hash tables/hashing.	10	10	0	0
Graphs.	10	10	0	0
Total:	100	100	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Understands basic topics in mathematics, probability and statistics, computer science and electrical engineering, and how they relate to the field of computer programming.	Midterm exams, final exam.
Able to design a software system, component or process to meet desired needs using appropriate software engineering principles	Written and programming assignments.
Orients in the application of the basic principles of mathematics for the practical implementation of high-level data structures.	Written and programming assignments.
Able to create advanced data structures, algorithms, coding methods used in industry.	Written and programming assignments.

Evaluation criteria of study results

Criterion	%
Midterm exams	20

Final exam	30
Written and programming assignments	50
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	7.0	40.0	60.0	0.0		*	