Study programme(s): Information Technologies

Level: Bachelor

Course title: Data Structure and Algorithms I

Lecturer: Vladimir Kurbalija

Status: obligatory

ECTS: 7

Requirements: none

Learning objectives

The objective of the course is to enable the students to understand and use dynamic data structures.

Learning outcomes

Minimum: At the end of the course, it is expected that a successful student is able to realize a basic dynamic data structure using pointers/references.

Desirable: At the end of the course, it is expected that a successful student is able to identify a suitable data structure for solving a problem and implement it using pointers/references where applicable.

Syllabus

Theoretical instruction

Basic concepts of programming languages needed for efficient programming of data structures and algorithms. The definition of abstract data types. Various criteria for implementing data types. Algorithm efficiency and complexity score. Abstract data type LIST. Implementation of a list and basic operations with a list. Circular lists, use of headers and limiters. Multiply linked lists. Abstract data types stack and queue. Various implementations of stack and queue.

Practical instruction

Implementation of various data structures (list, stack, queue...). Typical applications of the presented algorithms, algorithmic techniques and abstract data types.

Literature

Recommended

1. Đura Paunić, *Data Structures and Algorithms,* University of Novi Sad, Faculty of Sciences, University book, Novi Sad, 1997.
2. Michael T. Goodrich, Roberto Tamassia and Michael H. Goldwasser. *Data structures & algorithms in Java*, Sixth edition. Wiley. 2014.
3. Vladimir Kurbalija, Miloš Radovanović, Doni Pracner, *Zbirka zadataka iz predmeta Strukture podataka i algoritmi 1*, Prirodno-matematički fakultet, 2014

Weekly teaching load				
Lectures: 2	Exercises: 1	Practical Exercises: 2	Student research:	Other:

Teaching methodology

Classical methodology is applied during lectures.. The basic dynamic data structures are explained and illustrated by examples. During theoretical and practical exercises the programming language Java is used to implement data structures and practical examples of their use. The knowledge of students is tested during the exercises through four practical tests, which cover the materials that were presented. At the oral part of examination students demonstrates their understanding of data structures and algorithms on them.

Grading method (maximal number of points 100)

Pre-exam oblications	**points**	**Final exam**	**points**
4 practical tasks	60 (10+20+20+10)	oral examination	*40*