Study program: Artificial Intelligence

Name of the subject: Data Structures and Algorithms

Teacher(s): Miloš Savić

Status of the subject: elective

Number of ECTS credits: 6

Conditions: none

Subject goal

Enabling the student to understand and use dynamic data structures and to apply advanced algorithms on these structures.

Outcome of the subject

Minimum: At the end of the course, it is expected that a successful student is able to realize a given data structure and to implement corresponding algorithms.
Desirable: At the end of the course, it is expected that a successful student is able to identify a suitable data structure for a particular problem and implement it using pointers where applicable together with necessary algorithms.

Subject content

Theory

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 and their implementation. Sorting algorithms. Advanced data structures: hash tables, priority queues, trees and graphs.

Practical learning

Implementation of various data structures (list, stack, queue, tree, graph...), and various ways of their practical application.

Literature

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, Michael H. Goldwasser, *Data Structures and Algorithms in Python*, Wiley; 1 edition (March 18, 2013)

Number of active teaching classes	**Theoretical teaching: 2**	**Practical teaching: 3**

Method of carrying out the teaching

At lectures, classical methodology is applied. Mentioned dynamic data structures are explained and illustrated by examples. During theoretical and practical exercises explained data structures and practical examples of their use are practiced. 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 the examination students demonstrate their understanding of data structures and algorithms on them.

Evaluation of knowledge (maximum number of points 100)

Pre-exam obligations	points	**Final exam**	points
Four tests	15+15+15+15	Oral exam	40