



## **Module Specification**

### **Data Structures and Algorithms [TSI]**

Version: 2023-24, v2.0, 07 Aug 2023

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## Part 1: Information

**Module title:** Data Structures and Algorithms [TSI]

**Module code:** UFCFSW-12-1

**Level:** Level 4

**For implementation from:** 2023-24

**UWE credit rating:** 12

**ECTS credit rating:** 6

**College:** College of Arts, Technology and Environment

**School:** CATE School of Computing and Creative Technologies

**Partner institutions:** Transport and Telecommunication Institute

**Field:** Computer Science and Creative Technologies

**Module type:** Module

**Pre-requisites:** None

**Excluded combinations:** None

**Co-requisites:** None

**Continuing professional development:** No

**Professional, statutory or regulatory body requirements:** None

## Part 2: Description

**Overview:** Not applicable

**Features:** Not applicable

**Educational aims:** The aim of this module to familiarise students with basic data structures and their application for complex objects implementation, to study algorithms, data processing and analysis of their effectiveness. The module provides an acquisition of practical skills in the implementation of data structures and

algorithms. The module adopts to design different data structures, to realise basic algorithms of different data structures processing, and to evaluate the efficiency of these algorithms (abilities), to choose for each task optimal data structures and their processing algorithms (competences)

**Outline syllabus:** •Introduction to Information systems. Concepts of data structures, classification, main idea.

- Algorithm, it's properties. Effectiveness of algorithms.
- Array as fundamental data structure. Searching in arrays: main algorithms.
- Array: Sorting algorithms.
- Record and set as fundamental data structures. String as linear data structure.
- List as dynamic data structure. Main operations with the lists. Stack, queue and deck models: implementation, main operations, applications.
- Graphs. Implementations of graphs. Basic graph algorithms.
- Trees. Main elements and characteristics. Binary trees. Implementation of binary trees. Main algorithms. AVL trees. B-trees.
- Files: classifications, Merge sorting algorithms.

### **Part 3: Teaching and learning methods**

**Teaching and learning methods:** Learning and teaching will be provided to students in two forms: lectures and practical classes.

During lectures, theoretical aspects of the course will be provided to students by the teaching staff. Lectures will be supported by presentation published and available to the students on e.tsi.lv under the module section. Also, additional materials, like publications on the internet, videos etc will be presented in e.tsi.lv.

During practical classes, each student receives an individual task to perform.

There are two types of practical tasks:

First type is with programming and analysing

Second is writing and exercise resolving.

Each practical task should be completed and uploaded to e.tsi.lv (under specific practical task element)

In addition to learning activities during taught sessions, students are expected to spend time outside of class on independent learning activities. These might include completing assignment tasks, independent reading, practising new skills on personal projects and watching informative videos, completing self-assessment test etc.

**Module Learning outcomes:** On successful completion of this module students will achieve the following learning outcomes.

**MO1** To know different data structures implementation and application in software design and basic algorithms of data structures processing.

**MO2** To design different data structures, to realise basic algorithms of different data structures processing, and to evaluate the efficiency of these algorithms (abilities).

**MO3** To choose for each task optimal data structures and their processing algorithms (competences).

**Hours to be allocated:** 120

**Contact hours:**

Independent study/self-guided study = 96 hours

Face-to-face learning = 64 hours

Total = 160

**Reading list:** The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://rl.talis.com/3/uwe/lists/18E014F5-AA60-918C-B1F3-7E3358C3D751.html?lang=en-gb&login=1) via the following link <https://rl.talis.com/3/uwe/lists/18E014F5-AA60-918C-B1F3-7E3358C3D751.html?lang=en-gb&login=1>

## Part 4: Assessment

**Assessment strategy:** Assessments include:

- 1) performing laboratory works (summative assessment)
- 2) examination (summative assessment).

Laboratory work is carried out by students independently. The main task is the

acquisition of practical skills and the application of theoretical knowledge gained during the classes.

The course ends with an exam, which is aimed at assessing the theoretical knowledge.

Students are required to resit failed assessments during the resit period.

**Assessment tasks:**

**Portfolio (First Sit)**

Description: A series of laboratory tasks, the implementation of data structures and algorithms for their processing, which should be completed by the students.

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

**Examination (First Sit)**

Description: Final examination (3 hours) which will assess the students understanding of taught material that forms part of the learning outcomes but cannot easily be assessed through practical tasks.

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3

**Portfolio (Resit)**

Description: A series of laboratory tasks, the implementation of data structures and algorithms for their processing, which should be completed by the students.

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3

**Examination (Resit)**

Description: Final examination (3 hours) which will assess the students understanding of taught material that forms part of the learning outcomes but cannot easily be assessed through practical tasks.

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3

**Part 5: Contributes towards**

This module contributes towards the following programmes of study:

Computer Science and Software Development {Double Degree} {Foundation} [TSI]  
BSc (Hons) 2022-23

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BSc (Hons) 2022-23