



## MODULE SPECIFICATION

| Part 1: Information       |  |                    |  |
|---------------------------|--|--------------------|--|
| Module Title              | Data Structures and Algorithms [TSI]     |                    |  |
| Module Code               | UFCFSW-12-1                              | Level              | Level 4                                    |
| For implementation from   | 2021-22                                  |                    |  |
| UWE Credit Rating         | 12                                       | ECTS Credit Rating | 6  |
| Faculty                   | Faculty of Environment & Technology      | Field              | Computer Science and Creative Technologies |
| Department                | FET Dept of Computer Sci & Creative Tech |                    |  |
| Module Type:              | Standard                                 |                    |  |
| Pre-requisites            | None                                     |                    |  |
| Excluded Combinations     | None                                     |                    |  |
| Co-requisites             | None                                     |                    |  |
| Module Entry Requirements | None                                     |                    |  |
| PSRB Requirements         | None                                     |                    |  |

| Part 2: Description   |
|---|
| <p><b>Educational Aims:</b> 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)</p> <p><b>Outline Syllabus:</b> Introduction to Information systems. Concepts of data structures, classification, main idea;<br/>           Algorithm, it's properties. Effectiveness of algorithms;<br/>           Array as fundamental data structure. Searching in arrays: main algorithms;<br/>           Array: Sorting algorithms;<br/>           Record and set as fundamental data structures. String as linear data structure;<br/>           List as dynamic data structure. Main operations with the lists. Stack, queue and deck models: implementation, main operations, applications;<br/>           Graphs. Implementations of graphs. Basic graph algorithms;<br/>           Trees. Main elements and characteristics. Binary trees. Implementation of binary trees. Main</p> |

## STUDENT AND ACADEMIC SERVICES

algorithms. AVL trees. B-trees;  
Files: classifications, Merge sorting algorithms;

**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.

### Part 3: Assessment

This module assessment is split into two components (A – Exam, B – Practical Assignments):

The practical assignment component should be completed individually (i.e. this is not group work) and represents 80% of your final module mark. The practical assignment has four elements, as follows.

A - 3 hour examination test which will assess the students understanding of taught material that forms part of the learning outcomes but cannot easily be assessed through practical tasks.

B – component will consist from:  
practical programming assignments.  
practical writing assignments  
in-class tests

| First Sit Components        | Final Assessment | Element weighting | Description   |
|-----------------------------|------------------|-------------------|---|
| Examination - Component A   | ✓                | 20 %              | Examination   |
| Portfolio - Component B     |                  | 52 %              | A series of programming assignment including a written report and a copy of any developed programs. |
| In-class test - Component B |                  | 28 %              | multiple-choice covering each topic of the module   |
| Resit Components            | Final Assessment | Element weighting | Description   |
| Examination - Component A   |                  | 20 %              | Examination   |
| Portfolio - Component B     |                  | 52 %              | A series of programming assignment including a written report and a copy of any developed programs. |
| In-class test - Component B |                  | 28 %              | multiple-choice test, covering all topics of the module   |

| <b>Part 4: Teaching and Learning Methods</b>   |   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
|--|---|---------------------------------|------------------|--|-----|--|-----|---|-----|---------------------------------------|-----|---|----|------------------------------|-----|------------------------|-----|
| Learning Outcomes  | <p>On successful completion of this module students will achieve the following learning outcomes:</p> <table border="1"> <thead> <tr> <th style="text-align: left;"><b>Module Learning Outcomes</b></th> <th style="text-align: left;"><b>Reference</b></th> </tr> </thead> <tbody> <tr> <td>Understand different data structures, implementation and application in software design and basic algorithms of data structures processing</td> <td>MO1</td> </tr> <tr> <td>Understand and design different data structures, to realise basic algorithms of different data structures processing</td> <td>MO2</td> </tr> <tr> <td>Apply optimal data structures and their processing algorithms</td> <td>MO3</td> </tr> <tr> <td>Evaluate the efficiency of algorithms</td> <td>MO4</td> </tr> </tbody> </table>   | <b>Module Learning Outcomes</b> | <b>Reference</b> | Understand different data structures, implementation and application in software design and basic algorithms of data structures processing | MO1 | Understand and design different data structures, to realise basic algorithms of different data structures processing | MO2 | Apply optimal data structures and their processing algorithms | MO3 | Evaluate the efficiency of algorithms | MO4 |   |    |                              |     |                        |     |
| <b>Module Learning Outcomes</b>  | <b>Reference</b>  |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Understand different data structures, implementation and application in software design and basic algorithms of data structures processing | MO1   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Understand and design different data structures, to realise basic algorithms of different data structures processing                       | MO2   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Apply optimal data structures and their processing algorithms  | MO3   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Evaluate the efficiency of algorithms  | MO4   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Contact Hours  | <table border="1"> <thead> <tr> <th colspan="2"><b>Independent Study Hours:</b></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Independent study/self-guided study</td> <td style="text-align: center;">96</td> </tr> <tr> <td style="text-align: center;"><b>Total Independent Study Hours:</b></td> <td style="text-align: center;">96</td> </tr> <tr> <th colspan="2"><b>Scheduled Learning and Teaching Hours:</b></th> </tr> <tr> <td style="text-align: center;">Face-to-face learning</td> <td style="text-align: center;">64</td> </tr> <tr> <td style="text-align: center;"><b>Total Scheduled Learning and Teaching Hours:</b></td> <td style="text-align: center;">64</td> </tr> <tr> <td><b>Hours to be allocated</b></td> <td style="text-align: center;">120</td> </tr> <tr> <td><b>Allocated Hours</b></td> <td style="text-align: center;">160</td> </tr> </tbody> </table> | <b>Independent Study Hours:</b> |                  | Independent study/self-guided study  | 96  | <b>Total Independent Study Hours:</b>  | 96  | <b>Scheduled Learning and Teaching Hours:</b>                 |     | Face-to-face learning                 | 64  | <b>Total Scheduled Learning and Teaching Hours:</b> | 64 | <b>Hours to be allocated</b> | 120 | <b>Allocated Hours</b> | 160 |
| <b>Independent Study Hours:</b>  |   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Independent study/self-guided study  | 96  |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| <b>Total Independent Study Hours:</b>  | 96  |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| <b>Scheduled Learning and Teaching Hours:</b>  |   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Face-to-face learning  | 64  |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| <b>Total Scheduled Learning and Teaching Hours:</b>  | 64  |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| <b>Hours to be allocated</b>   | 120   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| <b>Allocated Hours</b>   | 160   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |
| Reading List   | <p><i>The reading list for this module can be accessed via the following link:</i></p> <p><a href="https://rl.talis.com/3/uwe/lists/18E014F5-AA60-918C-B1F3-7E3358C3D751.html?lang=en-gb&amp;login=1">https://rl.talis.com/3/uwe/lists/18E014F5-AA60-918C-B1F3-7E3358C3D751.html?lang=en-gb&amp;login=1</a></p>   |                                 |                  |  |     |  |     |   |     |                                       |     |   |    |                              |     |                        |     |

| <b>Part 5: Contributes Towards</b>   |  |
|--|--|
| This module contributes towards the following programmes of study:                                   |  |
| Computer Science and Software Development [Oct][PT][TSI][5yrs] BSc (Hons) 2020-21 BSc (Hons) 2020-21 |  |
| Computer Science and Software Development [Oct][FT][TSI][4yrs] BSc (Hons) 2020-21                    |  |
| Computer Science and Software Development [Feb][FT][TSI][4yrs] BSc (Hons) 2020-21                    |  |
| Computer Science and Software Development [Feb][PT][TSI][5yrs] BSc (Hons) 2020-21 BSc (Hons) 2020-21 |  |