



## MODULE SPECIFICATION

Part 1: Information			
Module Title	Numerical Methods in Computer Calculations [TSI]		
Module Code	UFCF9X-12-2	Level	Level 5
For implementation from	2022-23		
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 acquaint the students of most common numerical methods, it's positive and negative properties and accuracy, to discuss and make interpretation of results, to familiarize the students with typical mathematical tasks solving by standard numerical methods in computer applications and researches. The module adopts the use of modern applied mathematics and engineering calculus software such as Matlab to complete the practical assignment. The module provides a strong practical element giving ample opportunity to learn and practise new skills in applied software design.</p> <p><b>Outline Syllabus:</b> Sources and main reasons of errors in computer calculations;            Conditionally of tasks, stability and convergence of methods;            Direct and iterative methods of the decision of systems of linear equations;            Local and global interpolation. Approximation;            Application of methods of numerical differentiation and integration;            Iterative methods of the decision of non-linear equations and their systems;            One-dimensional and N-dimensional optimisation. Search methods;            Numerical methods of the decision of differential equations and their systems;            Numerical methods of the decision of equations with partial derivatives;            Recursive and morphological methods. Cellular automata.</p>

## STUDENT AND ACADEMIC SERVICES

**Teaching and Learning Methods:** Learning and teaching will be provided to students in three forms: lectures, practical (laboratory) classes, and independent homeworks. During lectures, theoretical aspects of the course will be provided to students by the teaching staff. Lectures will be supported by lectures video records published and available to the students on e.tsi.lv under the module section. Also, additional materials, like presentations, publications on the internet etc will be presented in e.tsi.lv.

Modern programming software such as Visual Studio C++ will be used in laboratory classes (students' choice) for the algorithms design in comparison with the results in Matlab from practical classes. In addition to learning activities during taught sessions, students are expected to spend time outside of class on independent learning activities. These include completing individual assignment task (homework), independent reading, practising new skills on personal projects and watching informative videos etc.

### Part 3: Assessment

During practical classes all the students obtain the base of calculus culture, task formulation and software application for standard computer calculations. During laboratory classes each student (joined to permanent working team of 2-3 persons) receives an individual task to perform. The defence is happening orally and consists of discussion on theoretical issues which fits current practical assignment and assignment report.

First Sit Components	Final Assessment	Element weighting	Description
In-class test - Component A		60 %	A series of ongoing in-class tests, covering the various topics covered in this module.
Portfolio - Component B		40 %	A series of group reports, containing solutions from each of the group members for their set individual given task, and two given individual tasks solution results implemented using Matlab and testing according to the individual task.
Resit Components	Final Assessment	Element weighting	Description
In-class test - Component A		60 %	A series of ongoing in-class tests, covering the various topics covered in this module. (re-sit only failed tests)
Portfolio - Component B		40 %	A series of reports, containing solutions from set tasks. Two of the given tasks solution should be implemented using Matlab and testing.

### Part 4: Teaching and Learning Methods

On successful completion of this module students will achieve the following learning outcomes:

Learning Outcomes	Module Learning Outcomes	Reference
	Understand the basic concepts and terminology in the field of numerical methods and computer mathematics	MO1
	Apply principles of standard numerical methods and algorithms	MO2
	Correctly use the simplest methods in applied programming tasks	MO3
	Estimate errors of calculations, its sources and main reasons	MO4
	Perform the algorithms, testing and performance analysis in the software applications of numerical methods	MO5

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	Apply standard tools and capabilities of engineering calculations system MATLAB for quick settlement of the study and research tasks	MO6
	Interpret numerical algorithms results	MO7
	Establish communications and work in a multicultural and multilingual environment, and working groups work to achieve a common assignment result	MO8
	Independently find, acquire and adapt information related to the field of professional activity	MO9
Contact Hours	<b>Independent Study Hours:</b>	
	Independent study/self-guided study	48
	<b>Total Independent Study Hours:</b>	48
	<b>Scheduled Learning and Teaching Hours:</b>	
	Face-to-face learning	32
	<b>Total Scheduled Learning and Teaching Hours:</b>	32
	<b>Hours to be allocated</b>	120
	<b>Allocated Hours</b>	80
Reading List	<p>The reading list for this module can be accessed via the following link:</p> <p><a href="https://rl.talis.com/3/uwe/lists/8DDEBBCE-2EA8-37A4-939D-34CEDF14878C.html?lang=en-gb&amp;login=1">https://rl.talis.com/3/uwe/lists/8DDEBBCE-2EA8-37A4-939D-34CEDF14878C.html?lang=en-gb&amp;login=1</a></p>	

### Part 5: Contributes Towards

This module contributes towards the following programmes of study:

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