



# POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

## COURSE SYLLABUS

ACADEMIC YEAR: 2022/2023

### 1. GENERAL COURSE INFORMATION

1.1 Course name	Algorithms and data structures			
1.2 Study program/s	Undergraduate professional study in Computer Science			
1.3 Course status (O,E)	Obligatory	1.6 Mode of instruction (number of hours)	Lectures	30
1.4 Course code			Exercises	45
1.5 Course abbreviation			Seminars	
1.6 Semester	3		E-learning	
1.7 ECTS	7	1.7 Place and time of instruction	The premises of Polytechnic of Međimurje in Čakovec, according to schedule published on web pages	

### 2. TEACHING STAFF

2.1 Course leader/s-title	PhD. Bruno Trstenjak, senior lecturer Miran Kovačić, lecturer	contact	<a href="mailto:btrstenjak@mev.hr">btrstenjak@mev.hr</a>  mkovacic@mev.hr
		contact	
2.2 Assistant/s- title		contact	
		contact	
2.3 Instruction held by-title	Miran Kovačić, lecturer	contact	

### 3. COURSE DESCRIPTION

3.1 Course goals	After completing the course, the student will be able to apply different data structures using different program algorithms. The student will be able to apply the acquired knowledge in the field of data structures and algorithms in the independent execution of program tasks.
3.2 Prerequisites	Passed courses: Programming, Mathematics 1
3.3 Course outcomes	After successfully completing the course, students will be able to: O1 - Explain the basic properties and characteristics of different data structures O2 - Explain how different simple and advanced programming algorithms work and recognize the complexity of the algorithm O3 - Make an analysis of the efficiency of individual algorithms in solving problem tasks O4 - Apply various data structures and algorithms in solving problem tasks O5 - Identify appropriate data structures and algorithms in solving specific problems
3.4 Course content	The content of the course continues the acquired knowledge from the course in the course Programming. The most widely used algorithms and data structures are processed. After dynamic memory allocation, memory allocation examples, and function call mechanism, the notion of algorithm complexity is introduced. Recursion is explained and illustrated. The search techniques are continued and then all the important sorting algorithms follow. Dynamic data structures are introduced: single and multiple linked lists. Basic data structures such as hence and order are built. Then the diffuse addressing technique, binary

	trees and binary search tree are introduced. Application of data compression algorithms and search of character and numeric data strings.																																													
3.5 Types of coursework	X	Lectures	X	Exercises		Blended e-learning	X	Individual activities		Laboratory																																				
		Seminars and workshops	X	Distant learning		Field classes		Multimedia and network		Mentorship																																				
		Other																																												
3.6 Language of instruction																																														
3.7 Monitoring students' work (enter the number of ECTS credits for each activity so that the total number of ECTS credits is equal to the total ECTS value of the course, 1 ECTS = 30 hours)	2,5	Class attendance		0,5	Seminars			Essay																																						
		Class activity			Project			Report/paper																																						
	3,0	Midterm exams			Practical task			Continuous knowledge check																																						
		Written exam			Experimental work																																									
	1,0	Oral exam			Research																																									
3.8 Assessment and evaluation of students' work during classes and at the final exam	<table><tr><th>Activity specification</th><th>Percent %</th><th>Points</th></tr><tr><td colspan="3">Assessment during instruction</td></tr><tr><td>Attendance</td><td>5%</td><td>5</td></tr><tr><td>Continuous assessment</td><td>20%</td><td>20</td></tr><tr><td>Seminar/ project/ essay</td><td>5%</td><td>5</td></tr><tr><td>Midterm exam 1</td><td>15%</td><td>15</td></tr><tr><td>Midterm exam 2</td><td>15%</td><td>15</td></tr><tr><td>Midterm exam 3</td><td>15%</td><td>15</td></tr><tr><td>Oral exam</td><td>25%</td><td>25</td></tr><tr><td colspan="3"><i>Exam assessment for the students who failed to fulfill all the obligatory requirements during the semester</i></td></tr><tr><td>Written exam</td><td>45%</td><td>45</td></tr><tr><td><b>Total:</b></td><td><b>100%</b></td><td><b>100</b></td></tr></table>										Activity specification	Percent %	Points	Assessment during instruction			Attendance	5%	5	Continuous assessment	20%	20	Seminar/ project/ essay	5%	5	Midterm exam 1	15%	15	Midterm exam 2	15%	15	Midterm exam 3	15%	15	Oral exam	25%	25	<i>Exam assessment for the students who failed to fulfill all the obligatory requirements during the semester</i>			Written exam	45%	45	<b>Total:</b>	<b>100%</b>	<b>100</b>
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3.9 Assessment criteria – analysis per learning outcomes	Ways of evaluating learning outcomes																																													
		Attendance	Continuous asse.	Mid-term exam 1	Mid-term exam 2	Mid-term exam 3	Seminar	Oral exam	Total																																					
	Outcome 1			5				5	10																																					
	Outcome 2		5	10	5			5	25																																					
	Outcome 3		5		10			5	20																																					
	Outcome 4		5			5		5	15																																					
	Outcome 5		5			10		5	20																																					
	Outcome not-related	5					5		10																																					
	<b>Total</b>	5	20	15	15	15	5	25	100																																					
	Grading of outcomes (in order to pass the mid-term exam/exam the student must achieve at least 50% points for each learning outcome)																																													
	Points      Grade																																													
	89 – 100    excellent (5)																																													
	76 – 88     very good (4)																																													
	63 – 75     good (3)																																													
50 – 62     pass (2)																																														
0 – 49      fail (1)																																														

<b>3.10 Specific features related with taking the course</b>	If a student collects 50% of the points of each outcome, he / she directly takes the exam, if he / she has submitted a seminar paper. A student cannot access the exam if he / she has not submitted a seminar paper. Seminar papers are prepared according to the instructions published on the Merlin system and are submitted by posting on the Merlin. The seminar paper should be submitted at least 3 days before the exam deadline.	
<b>3.11 Students obligations</b>	<p>Full-time students are required to attend at least 70% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. Part-time students are required to attend at least 30% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. If the student has not fulfilled all the obligations set by the course, he is obliged to attend the lectures again and meet the conditions for taking the exam.</p> <p>Attendance can be offset by online tuition, organised webinars and added assignments given by teachers. One lesson lasts 45 minutes, and several hours form a teaching unit. Absence from one teaching unit is counted as one absence. Delays and apologies are recorded separately. In that case, if the student missed more than 50% of classes, and has a justifiable reason/apology, the request should be submitted to the Department Council, which then decides on the justification of student absences with the obligatory opinion of the course leader.</p>	
<b>3.12 Written assignments</b>		
<b>3.13 Required reading</b>	1.	Dr. Clifford A. Shaffer: Data Structures and Algorithm Analysis in C++,Dover Publications, 2011.
	2.	
<b>3.14 Additional reading</b>	1.	Henry H Liu: Algorithms with Implementations in C: A Quantitative Approach, Independently published, 2019.
	2.	Adam Drozdek: Data Structure and Algorithm in C++, Cengage Learning India, 2013.
<b>4 ADDITIONAL COURSE INFORMATION</b>		
<b>4.1 Quality control</b>	The quality of the program, teaching process, teaching skills and level of mastery of the material will be established by conducting a written evaluation based on questionnaires, and in other standardised ways and in accordance with the by-laws of the Polytechnic of Međimurje in Čakovec.	
<b>4.2 Contact the teacher</b>	Students can contact the teacher during the office hours and during classes, while for short questions and explanations they can contact him/her any day during working hours by coming in person or by landline. It is also possible to ask questions by e-mail, which will be answered in 48 hours at the latest. It is desirable for students to come as often as possible for any possible questions during the teacher's office hours.	
<b>4.3 Information about the course</b>	It is the obligation of each student to be regularly informed about the course. All notifications about the classes or possible postponement of classes will be posted on the bulletin board and on the website of the Polytechnic at least 24 hours in advance.	

<b>4.4 Course contribution to the study program</b>	<ul style="list-style-type: none"> <li>- Develop programming code in multiple programming languages using modern methods and tools</li> <li>- Choose ways of structuring data in program code, as well as techniques for writing complex program forms and use standard algorithms</li> </ul>
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