

Universitas Negeri Surabaya Faculty of Postgraduate School, Master of Technology and Vocational Education Study Program

Document Code

SEMESTER	LEARNING	

Courses				CODE		Cours	e Famil	/	Crec	lit We	ight	SEME	STER	Compilation Date
Algorithn	n De	sign and Analysi	s	831010202	1	Study Electiv	Program /e Cours	ı es	T=2	P=0	ECTS=4.48		1	May 10, 2023
AUTHOR	IZAT	ION		SP Develo	per	•		Course Cluster Coordinator			Study	Program	n Coordinator	
				Dr. Lilik Ani	ifah, S.T., N	И.Т.						Dr. Ir. Achmad Imam Agung, M.Pd.		
Learning model		Project Based L	.earnir	ng				1				L		
Program		PLO study pro	gram	that is cha	rged to th	ne course								
Learning Outcome		Program Object	ctives	(PO)										
(PLO)		PLO-PO Matrix												
	P.O													
		PO Matrix at th	e end	l of each le	arning sta	age (Sub-	PO)							
			F	P.O					Weel	k				
				1	2 3	4 5	6	7 8	9	10	11 12	13	14	15 16
Short Course Descript	ion	This lecture disc Types, Algorithm	usses Desig	the concep In Methods,	ts of Algor Function G	ithms, Top rowth, Sea	Down, I rch, Sort	Bottom L ing Algo	Jp Pro rithms	ogram and ti	ming, Data S neir applicatio	tructure ns in eve	Models, eryday lif	Abstract Data e.
Reference	ces	Main :												
			& Anal	ysis of Algor										Introduction to of Algorithms.
		Supporters:												
		1. Jurnal p	enelitia	an yang relev	/an									
Supporti lecturer	ing	Dr. Lilik Anifah, S	S.T., М	.т.										
			Eva	Evaluation			Help Learning, Learning methods, Student Assignments, [Estimated time]			Learning materials [References]	Assessment Weight (%)			
	(Su	b-PO)	In	ndicator	Criteria	a & Form		ine (ine)	0	nline	(online)]	
(1)		(2)		(3)	(4)	(5)			(6)	((7)	(8)

1	Understanding Algorithms	- Understanding the definition of an algorithm - Explaining the steps for creating an algorithm. Providing an example of an algorithm in a case	Criteria: Assessment score 0-100 Form of Assessment : Participatory Activities	Discussion, simulation and reflection 2 X 50	Material: Basic Algorithms References: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Analysis of Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	0%
2	Can analyze Top Down and Bottom Up Programming algorithms	- Understanding Top Down Programming - Explaining examples of Top Down Programming - Understanding Bottom Up Programming Explaining examples of Bottom Up	Criteria: Assessment score 0-100 Form of Assessment : Participatory Activities	Presentation, discussion and reflection 2 X 50	Material: Programming Methods Literature: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Alagorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	0%
3	Understanding Data Structure Models and Abstract Data Types	- Know the Graph/Network Model - Can represent Networks - Understand Connect Algorithms - Understand Data Structures	Criteria: Assessment score 0-100 Form of Assessment : Participatory Activities	Book [2] Handout 2 X 50	Material: Data Structure Model and Abstract Data Type Library: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	0%
4	Understanding Data Structure Models and Abstract Data Types	- Know the Graph/Network Model - Can represent Networks - Understand Connect Algorithms - Understand Data Structures		Book [2] Handout 2 X 50		0%

5	Can create programming designs using various Algorithm Design Methods	- Understanding Subgoals, Hill Climbing, Work Backward - Understanding Heuristics - Understanding Backtrack - Understanding Recursion Programming	Form of Assessment : Participatory Activities	Presentations, group discussions, simulations and reflections 2 X 50	Material: Understanding Subgoals, Hill Climbing, Work Backward - Understanding Heuristics - Understanding Backtrack - Understanding Recursion Programming Literature: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Analysis of Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	5%
6	Can create programming designs using various Algorithm Design Methods	- Understanding Subgoals, Hill Climbing, Work Backward - Understanding Heuristics - Understanding Backtrack - Understanding Recursion Programming	Criteria: Assessment score 0-100 Form of Assessment : Test	Presentations, group discussions, simulations and reflections 2 X 50	Material: - Understanding Subgoals, Hill Climbing, Work Backward - Understanding Heuristics - Understanding Backtrack - Understanding Recursion Programming Literature: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Analysis of Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	15%
7	Can create programming designs using various Algorithm Design Methods	- Understanding Subgoals, Hill Climbing, Work Backward - Understanding Heuristics - Understanding Backtrack - Understanding Recursion Programming		Presentations, group discussions, simulations and reflections 2 X 50		0%

8	UTS	Able to create a simple project about soeting and present it	Criteria: Assessment score 0-100 Form of Assessment : Project Results Assessment / Product Assessment	2 X 50 Project Presentation	Material: Project presentation Bibliography: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Analysis of Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms.	30%
9	1. Understanding MST Search with Prim's Algorithm 2. Understanding Kruskal's Algorithm 3. Understanding BFS 4. Understanding DFS 5. Understanding A*	1. Able to explain the algorithm and case examples and their solutions MST Search with the Prim Algorithm 2. Able to explain the algorithms and case examples and their solutions Kruskal Algorithm 3. Able to explain the algorithms and case examples and case examples and their solutions BFS 4. Able to explain the algorithms and case examples and their solutions Mmahamie DFS 5. Able to explain the algorithm and case examples as well as solving the A* algorithm	Criteria: Assessment score 0-100 Form of Assessment : Participatory Activities	 Direct Instruction, Discussion, Paper Review, Assignment, 2 X 50 Presentations 	3rd edition. Pearson. Material: MST search with Algorithms Library: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Analysis of Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	0%
10	1. Understanding MST Search with Prim's Algorithm 2. Understanding Kruskal's Algorithm 3. Understanding BFS 4. Understanding DFS 5. Understanding A*	 Able to explain the algorithm and case examples and their solutions MST Search with the Prim Algorithm 2. Able to explain the algorithms and case examples and their solutions Kruskal Algorithm 3. Able to explain the algorithm 3. Able to explain the algorithms and case examples and their solutions BFS 4. Able to explain the algorithms and case examples and their solutions Mmahamie DFS 5. Able to explain the algorithm and case examples as well as solving the A* algorithm 	Form of Assessment : Participatory Activities	 Direct Instruction, Discussion, Paper Review, Assignment, 2 X 50 Presentations 	Material: MST search with Algorithms Library: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Analysis of Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	0%

11	1. Understanding MST Search with Prim's Algorithm 2. Understanding Kruskal's Algorithm 3. Understanding BFS 4. Understanding DFS 5. Understanding A*	1. Able to explain the algorithm and case examples and their solutions MST Search with the Prim Algorithm 2. Able to explain the algorithms and case examples and their solutions Kruskal Algorithm 3. Able to explain the algorithms and case examples and their solutions BFS 4. Able to explain the algorithms and case examples and their solutions Mmahamie DFS 5. Able to explain the algorithm and case examples as well as solving the A* algorithm		 Direct Instruction, Discussion, Paper Review, Assignment, 2 X 50 Presentations 			0%
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12	1. Explain Bubble	1. Students	Criteria:	· Direct		Material:	5%
1	Sort 2. Explain	are able to	Assessment score	Instruction -		Searching	070
1	Selection Sort 3.	explain the	0-100	Discussion ·		algorithm	
1	Explain Insertion	Bubble Sort	0 100				
	Sort 4. Explain	algorithm and	Form of	Questions and		References:	
1	Heap Sort 5.	provide		answers,		1. Cormen.	
1	Explain Shell Sort	examples of	Assessment :	Review Paper		2009.	
1	Explain Quick	cases in the	Participatory	2 X 50		Introduction to	
1	Sort 7. Explain	paper and their	Activities			Algorithms 3rd	
1	Merge Sort 8.	solutions 2.				edition.	
1	Explain Radix Sort	Students are				Massachusetts	
	Explain Tree	able to explain				Institute of	
	Sort	the algorithm					
		explaining				Technology.	
		Selection Sort				2.Rao.	
		and provide				Introduction to	
		examples of				Design &	
		cases in the				Analysis of	
		paper and their				Algorithms - In	
		solutions 3.				a Simple Way	
		Students are				3. Levitin.	
		able to explain				2012.	
		the algorithm					
		explaining				Introduction to	
		Insertion Sort and provide	1			The Design	
		examples of	1			and Analysis	
1		cases in the				of Algorithms.	
1		paper and their				3rd edition.	
1		solutions 4.				Pearson.	
		Students are	1				
1		able to explain					
		the algorithm	1				
1		explaining					
		Heap Sort and	1				
1		provide					
1		examples of					
1		cases in the					
		paper and their					
1		solutions 5.					
1		Students are					
		able to explain					
		the algorithm					
1		explaining					
		Shell Sort and					
1		provide	1				
1		examples of	1				
		cases in the					
		paper and their					
		solutions 6.					
		Students are					
		able to explain					
		the algorithm					
		explaining					
		Quick Sort and					
1		provide examples of					
1		cases in the	1				
1		paper and the	1				
1		solution 7.					
		Students are	1				
		able to explain	1				
1		the algorithm					
		explaining					
1		Merge Sort	1				
1		and provide					
		examples of					
1		cases in the	1				
1		paper and their	1				
1		solutions 8.					
		Students are	1				
		able to explain	1				
1		the algorithm	1				
1		explaining					
1		Radix Sort and	1				
1		provide	1				
1		examples of					
1		cases in the					
		paper and their	1				
1		solutions 9.	1				
1		Students are	1				
1		able to explain the algorithm					
1		explaining	1				
1		Tree Sort and	1				
1		provide	1				
1		examples of					
		cases in the					
1		paper and the	1				
1		solution					
1		30101011					
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13	1. Explain Bubble	1. Students	Criteria:	· Direct		Material:	15%
	Sort 2. Explain	are able to	Assessment score	Instruction -	1	Sorting and	10,0
	Selection Sort 3.	explain the	0-100	Discussion ·	1	searching	
1	Explain Insertion	Bubble Sort	. 100			0	
	Sort 4. Explain	algorithm and	Form of	Questions and	1	References:	
	Heap Sort 5.	provide		answers, ·		1. Cormen.	
	Explain Shell Sort	examples of	Assessment	Review Paper		2009.	
	6. Explain Quick	cases in the	Test	2 X 50		Introduction to	
	Sort 7. Explain	paper and their				Algorithms 3rd	
	Merge Sort 8.	solutions 2.				edition.	
	Explain Radix Sort	Students are				Massachusetts	
	9. Explain Tree	able to explain					
	Sort	the algorithm				Institute of	
		explaining				Technology.	
		Selection Sort				2.Rao.	
		and provide				Introduction to	
		examples of				Design &	
		cases in the				Analysis of	
		paper and their				Algorithms - In	
		solutions 3.					
		Students are				a Simple Way	
		able to explain				3. Levitin.	
		the algorithm				2012.	
		explaining				Introduction to	
		Insertion Sort				The Design	
		and provide				and Analysis	
		examples of	1		1	of Algorithms.	
		cases in the	1		1	3rd edition.	
		paper and their	1		1		
		solutions 4.	1		1	Pearson.	
		Students are					
		able to explain	1		1		
		the algorithm					
		explaining Heap Sort and					
		provide					
		examples of cases in the					
		paper and their solutions 5.					
		Students are					
		able to explain					
		the algorithm					
		explaining					
		Shell Sort and					
		provide					
		examples of					
		cases in the					
		paper and their					
		solutions 6.					
		Students are					
		able to explain					
		the algorithm					
		explaining					
		Quick Sort and					
		provide					
		examples of					
		cases in the					
		paper and the					
		solution 7.	1		1		
1		Students are					
		able to explain	1		1		
		the algorithm	1		1		
1		explaining					
		Merge Sort and provide	1		1		
1		examples of					
		cases in the	1		1		
		paper and their	1		1		
		solutions 8. Students are	1		1		
		able to explain					
		the algorithm	1		1		
		explaining	1		1		
		Radix Sort and					
		provide	1		1		
		examples of	1		1		
		cases in the					
		paper and their					
		solutions 9.	1		1		
		Students are	1		1		
		able to explain					
		the algorithm					
		explaining	1		1		
		Tree Sort and	1		1		
		provide					
		examples of	1		1		
		cases in the	1		1		
1		paper and the					
		solution					
L			1		•	· 1	

r				1	· · · · · · · · · · · · · · · · · · ·	
14	1. Explain Bubble	1. Students	· Direct			0%
	Sort 2. Explain	are able to explain the	Instruction -			
	Selection Sort 3. Explain Insertion	Bubble Sort	Discussion			
	Sort 4. Explain	algorithm and	Questions and			
	Heap Sort 5.	provide	answers, ·			
	Explain Shell Sort	examples of	Review Paper			
	6. Explain Quick	cases in the paper and their	2 X 50			
	Sort 7. Explain Merge Sort 8.	solutions 2.				
	Explain Radix Sort	Students are				
	9. Explain Tree	able to explain				
	Sort	the algorithm				
		explaining				
		Selection Sort and provide				
		examples of				
		cases in the				
		paper and their				
		solutions 3.				
		Students are				
		able to explain the algorithm				
		explaining				
		Insertion Sort				
		and provide				
		examples of				
		cases in the paper and their				
		solutions 4.				
		Students are				
		able to explain				
		the algorithm				
		explaining Heap Sort and				
		provide				
		examples of				
		cases in the				
		paper and their				
		solutions 5. Students are				
		able to explain				
		the algorithm				
		explaining				
		Shell Sort and				
		provide				
		examples of cases in the				
		paper and their				
		solutions 6.				
		Students are				
		able to explain				
		the algorithm explaining				
		Quick Sort and				
		provide				
		examples of				
		cases in the				
		paper and the solution 7.				
		Students are				
		able to explain				
		the algorithm				
		explaining Morgo Sort				
		Merge Sort and provide				
		examples of				
		cases in the				
		paper and their				
		solutions 8. Students are				
		able to explain				
		the algorithm				
		explaining				
		Radix Sort and				
		provide examples of				
		cases in the				
		paper and their				
		solutions 9.				
		Students are				
		able to explain				
		the algorithm explaining				
		Tree Sort and				
		provide				
		examples of				
		cases in the				
		paper and the solution				
		SUILLIUM				
15	Implement	Students are				0%
	Searching and	able to	2 X 50			
	Sorting algorithms	implement	demonstration			
		Searching and Sorting	and			
		algorithms	presentation			

16	Implement Searching and Sorting algorithms	Students are able to implement Searching and Sorting algorithms	Criteria: Assessment score 0-100 Form of Assessment : Project Results Assessment / Product Assessment	2 X 50 demonstration and presentation		Material: Project presentation about searching References: 1. Cormen. 2009. Introduction to Algorithms 3rd edition. Massachusetts Institute of Technology. 2.Rao. Introduction to Design & Analysis of Algorithms - In a Simple Way 3. Levitin. 2012. Introduction to The Design and Analysis of Algorithms. 3rd edition. Pearson.	30%
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Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage							
1.	Participatory Activities	10%							
2.	Project Results Assessment / Product Assessment	60%							
3.	Test	30%							
		100%							

Notes

- Learning Outcomes of Study Program Graduates (PLO Study Program) are the abilities possessed by each Study
 Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of
 their study program obtained through the learning process.
- The PLO imposed on courses are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- 3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- 4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- 5. Indicators for assessing ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- 6. Assessment Criteria are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- 7. Forms of assessment: test and non-test.
- 8. Forms of learning: Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
- Learning Methods: Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
- 10. Learning materials are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 11. The assessment weight is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
- 12. TM=Face to face, PT=Structured assignments, BM=Independent study.