



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Undergraduate Mathematics Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																
Data Structure and Algorithmic Analysis	4420103133		T=3	P=0	ECTS=4.77	4	July 18, 2024																																
AUTHORIZATION		SP Developer		Course Cluster Coordinator		Study Program Coordinator																																	
			Prof. Dr. Raden Sulaiman, M.Si.																																	
Learning model	Case Studies																																						
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																						
	Program Objectives (PO)																																						
	PLO-PO Matrix																																						
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Short Course Description	This course examines the concepts of data structures and algorithms that can be applied to computer programs. The discussion begins with basic data structures which include linked-list, stack, queue, and tree. Then we discuss simple algorithms that use these data structures, such as searching and sorting. Next we discuss algorithms and data structures that are suitable for solving problems in everyday life through individual and group task-based learning, presented in theory and practice and demonstrating the results in computer programs.																																						
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td rowspan="2" style="width: 30px;">P.O</td> <td colspan="16">Week</td> </tr> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td> </tr> </table>							P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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References	Main :																																						
	1. Weiss, M. A. 2012. Data Structures & Algorithm Analysis in Java , 3rd Ed, Addison Wesley. 2. Cormen, T. H., C. E. Leiserson and R. L. Rives. 2009. Introduction to Algorithms , 3rd Ed. Cambridge: MIT Pres																																						
	Supporters:																																						
Supporting lecturer	Dr. Elly Matul Imah, M.Kom.																																						
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)																																
		Indicator	Criteria & Form	Offline (offline)	Online (online)																																		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)																																
1	Understand data types and abstract data structures	Using data types (array, structure and class) in computer programs.		· Lecture · Question and answer · Practicum 3 X 50			0%																																

2	Understand the linked-list data structure	Using the linked list data structure and its operations in computer programs.		· Lecture · Question and answer · Practicum 3 X 50			0%
3	Understand linked-list forms and their applications	<ol style="list-style-type: none"> 1. Uses the double linked-list data structure and related operations. 2. Uses circular linked-list data structure and related operations. 3. Using a multi linked-list data structure and related operations 		· Lecture · Question and answer · Discussion 3 X 50			0%
4	Understand the stack data structure and its application	<ol style="list-style-type: none"> 1. Mention the characteristics of the stack data structure 2. Implement push operations on the stack in the program 3. Implementing the pop operation on the stack and how to declare it in the program 		· Lecture · Question and answer · Practicum 3 X 50			0%
5	Understand the queue data structure and its application	<ol style="list-style-type: none"> 1. Mention the characteristics of the queue data structure. 2. Implement the add operation in the program. 3. Implement delete operations on queues in the program. 		· Lecture · Question and answer · Practicum 3 X 50			0%
6	Understand the tree data structure and its application	· Mention the characteristics of tree data structures · Mention the meaning of root, left child, right child, descendant		· Lecture · Question and answer · Giving assignments 3 X 50			0%
7	Understanding binary trees and traversal in binary trees	<ol style="list-style-type: none"> 1. Explain the meaning of a binary tree 2. Implement preorder traversal in the program 3. Implementing inorder traversal in the program 4. Implement postorder traversal in the program 		· Lecture · Question and answer · Giving assignments 3 X 50			0%
8				3 X 50			0%

9	Understand algorithms and algorithm analysis	<ol style="list-style-type: none"> 1.Mention the meaning of algorithms 2.Explaining an algorithm about a mathematical topic 3.Analyzing the running time of an algorithm with certain complexity (N^2, $N \log N$, N) 		Lectures Questions and answers Assignment 3 X 50			0%
10	Understand searching algorithms	<ol style="list-style-type: none"> 1.Explain the searching algorithm 2.Create a searching algorithm (simple) 3.Analyzing searching algorithms 		· Lecture · Question and answer · Giving assignments 3 X 50			0%
11	Understanding sorting algorithms (sorting)	<ol style="list-style-type: none"> 1.Explain the bubble sort algorithm 2.Analyzing the bubble sort algorithm 3.Implement the bubble sort algorithm in the program 4.Explain the selection sort algorithm 5.Analyzing the selection sort algorithm 6.Implementing the selection sort algorithm in the program 		· Lecture · Question and answer · Giving assignments 3 X 50			0%
12	Understanding sorting algorithms (sorting)	<ol style="list-style-type: none"> 1.Explain the insertion sort algorithm 2.Analyzing the insertion sort algorithm 3.Explain the merge sort algorithm 4.Analyzing the merge sort algorithm 5.Explain the bucket sort algorithm 6.Analyzing the bucket sort algorithm 		· Lecture · Question and answer · Giving assignments 3 X 50			0%
13	Understanding algorithms in mathematical problems	<ul style="list-style-type: none"> · Explaining an algorithm about a numerical problem · Analyzing an algorithm about a numerical problem · Implementing an algorithm about a numerical problem on a computer 		· Group discussion · Question and answer · Giving assignments 3 X 50			0%

14	Understanding algorithms in mathematical problems	· Explaining an algorithm about a numerical problem · Analyzing an algorithm about a numerical problem · Implementing an algorithm about a numerical problem on a computer		· Group discussion · Question and answer · Giving assignments 3 X 50			0%
15	Understanding algorithms in mathematical problems	· Explaining an algorithm about a numerical problem · Analyzing an algorithm about a numerical problem · Implementing an algorithm about a numerical problem on a computer		· Group discussion · Question and answer · Giving assignments 3 X 50			0%
16	Understanding algorithms in mathematical problems	· Explaining an algorithm about a numerical problem · Analyzing an algorithm about a numerical problem · Implementing an algorithm about a numerical problem on a computer		· Group discussion · Question and answer · Giving assignments 3 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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.
- 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.
- 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.
- 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.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.

