

## Algorithms and Data Structures

<b>Course Title:</b> Algorithms and Data Structures					
<b>Course Code:</b> CIE61010	<b>Student Workload:</b> 8.50 Hours/ Weeks	<b>Credits:</b> 3 Credits (4.50 ECTS)	<b>Semester:</b> 3 <sup>rd</sup> Semester	<b>Frequency:</b> Odd Semester	<b>Duration:</b> 16 Weeks/ Semester ( <i>Lecture and practical work:</i> 14 weeks; <i>Midterm assessment:</i> 1 week; <i>Final assessment:</i> 1 week)
<b>1</b>	<b>Types of Courses:</b> Content Knowledge Course	<b>Contact Hours:</b> <i>Lecturing:</i> 1.67 Hours/ Week; <i>Practical Work:</i> 2.83 Hours/ Week	<b>Independent Study:</b> <i>Self-study:</i> 2.00 Hours/ Week; <i>Structured Assignment:</i> 2.00 Hours/ Week	<b>Class Size:</b> 40 Students	
<b>2</b>	<b>Prerequisites for Participation</b> (If Applicable): Object-Oriented Programming				
<b>3</b>	<b>Learning Outcomes:</b> 4. M1: Able to make algorithms and compile them into programming code from simple case studies as basic knowledge and concepts with independent, quality, and measurable performance (ILO-4) (0,2) 5. M2: Able to mention various forms of data structures and methods of Abstract Data Type as basic knowledge (ILO-4) (0,2) 6. M3: Able to apply operations and solve simple cases of the linear list, stack, and queue data structures both independently and collaboratively according to programming concepts (ILO-5) (0,2) 7. M4: Able to apply operations and solve simple cases of non-linear data structures Tree, Binary Tree, Heap Tree, Binary Search Tree, and Graph both independently and in collaboration according to programming concepts (ILO-5) (0,2) 8. M5: Able to apply and solve simple cases from the Sorting and Searching method both independently and in collaboration as basic knowledge and concepts with independent, quality, and measurable performance (ILO-9)(ILO-12) (0,2)				
<b>4</b>	<b>Subject aims/Content:</b> At the end of the course, students are expected: 5. L1: Able to explain the definition of algorithm and the difference between flowchart and pseudocode, as well as making flowcharts using software (M1) 6. L2: Able to explain the definition of the data structure of the Abstract Data Type (ADT) as well as mention the method used and explain the use of the return type of each ADT method (M2) 7. L3: Able to compare the fundamental differences of the List data structure by using an array against a linked list, the differences between the Singly Linked List and Doubly Linked List data structures, as well as applying existing operations on linear data structures: LinkedList, Stack, and Queue (M3) 8. L4: Able to apply existing operations on non-linear data structures: Tree, Binary Tree, Heap Tree, Binary Search Tree, and Graph (M4) 9. L5: Able to apply sorting methods (bubble sort, insertion sort, and selection sort) and searching (linear search and binary search) (M5)				
<b>5</b>	<b>Teaching Methods:</b> Lecturing, Group Discussion, Case-Based Learning, Project-Based Learning				
<b>6</b>	<b>Assessment Methods:</b> Essay, performance test, anecdotal record/logbook, case assessment, project assessment				
<b>7</b>	<b>This Course is Used in The Following Study Programme/s as Well:</b> -				
<b>8</b>	<b>Responsibility for Course:</b>				

**Compulsory Course Handbook**  
**Bachelor Program of Information Technology Education**  
**Computer Science Faculty, Universitas Brawijaya**

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<b>9</b>	<b>Other Information:</b> Bibliography: <ol style="list-style-type: none"><li>1. Goodrich, M. T., Tamassia, R., &amp; Goldwasser, M. H., 2014. Data Structures and Algorithms in Java (6th Edition). Wiley: USA.</li><li>2. Cutajar, J., 2018. Begining Java Data Structures and Algorithms. Packt Publishing: USA.</li><li>3. Weiss, M.A., 2012. Data structures and algorithm analysis in Java, 3rd ed. Pearson Education: Canada.</li></ol>