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Bachelor in Computer Science

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MODULE HANDBOOK

Module name	**Algorithms and Data Structures**
Module level, if applicable	Bachelor
Code, if applicable	MII21-1203
Courses, if applicable	Algorithms and Data Structures
Semester(s) in which the module is taught	Spring (Even)
Person responsible for the module	I Gede Mujiyatna, S.Kom., M.Kom.
Lecturer(s)	I Gede Mujiyatna, S.Kom., M.Kom. Drs. Janoe Hendarto, M.Kom.
Language	Bahasa Indonesia and English
Relation to curriculum	Bachelor degree, compulsory, 2nd semester.
Teaching methods	100 minutes of lectures and 120 minutes of structured activities per week.
Workload (incl. contact hours, self-study hours)	1. Lectures: 3 x 50 = 150 minutes (2.5 hours) per week. 2. Exercises and Assignments: 3 x 60 = 180 minutes (3 hours) per week. 3. Private study: 3 x 60 = 180 minutes (3 hours) per week.
Credit points	3 credit points
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.
Required and recommended prerequisites for joining the module	MII21-1201 Programming

<table>
<tr><td>Learning outcomes and their corresponding PLOs</td><td>After completing this module, a student is expected to:
LO1 Students are able to explain the concept of object-oriented programming
LO2 Students are able to explain the linear data structure of strings, linked lists, stacks and queues
LO3 Students are able to explain non-linear data structures of trees and graphs and discuss algorithms related to trees and graphs
LO4 Students are able to describe network flow problems
LO5 Students are able to evaluate problem solving with disjoint set data structures
LO6 Students are able to decompose the problem of searching and matching strings
LO7 Students are able to describe algorithms for solving geometric problems

<table>
<tr><th colspan="2">PLO</th><th>LO1</th><th>LO2</th><th>LO3</th><th>LO4</th><th>LO5</th><th>LO6</th><th>LO7</th></tr>
<tr><td rowspan="5">Program Learning Outcome (PLO)</td><td>PLO1</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>PLO2</td><td></td><td></td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>PLO3</td><td></td><td></td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>PLO4</td><td></td><td></td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>PLO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>Content</td><td>This course is a continuation of the Programming course. This course provides students with knowledge and skills to determine the right data structure so that the resulting computer program is structured and efficient. This course also introduces students to some advanced data structures that require more complex analysis and design techniques, specialized topics that are advanced and in-depth. These special topics include modern and up-to-date algorithms that are often used to solve problems of high complexity. The programming method in this course adopts an object-oriented programming (OOP) approach. OOP is a topic of discussion in algorithms and data structures courses to provide students with the latest developments in programming technology.</td></tr>
<tr><td>Study and examination requirements and examination forms</td><td>In class group discussion, Quiz, Individual task, Group task, Mid-terms examination and Final examination</td></tr>
<tr><td>Media employed</td><td>LCD, Whiteboard, websites.</td></tr>
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Assessments and evaluation	**LO1** quiz 1 (2.5%), problem 1 midterm exam (5%) **LO2** quiz 2 (2.5%), individual task 1 (5%), problem 2 midterm exam (5%) **LO3** individual task 2 (5%), group task 1 (10%), problem 3 midterm exam (10%), **LO4** group task 2 (10%), problem 1 final exam (3.75%) **LO5** group task 3 (10%), problem 2 final exam (3.75%) **LO6** group task 4 (10%), problem 3 final exam (3.75%) **LO7** group task 5 (10%), problem 4 final exam (3.75%)
Reading list	1. Dasgupta, Sanjoy, Christos Papadimitriou, and Umesh Vazirani. *Algorithms*. McGraw-Hill, 2006. ISBN: 9780073523408. 2. Kleinberg, Jon, and Eva Tardos. *Algorithm Design*. Addison-Wesley, 2005. ISBN: 9780321295354. 3. Thomas H. Cormen, Charles E. Leiserson, et.al., *Introduction to Algorithms*, third edition, 2014. 4. Brian W. Kernighan, Dennis M., *The C Programming Language 2nd Edition*, 1988. Ritchie, ISBN-13: -0131103627.

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