

**UNDERGRADUATE PROGRAM IN COMPUTER SCIENCE  
DEPARTMENT OF COMPUTER SCIENCE AND ELECTRONICS  
FACULTY OF MATHEMATICS AND NATURAL SCIENCES  
UNIVERSITAS GADJAH MADA**

Module name	Advanced Algorithms
Module level	Undergraduate
Code	MII-2211
Courses(if applicable)	Advanced Algorithms
Semester	Spring (Even)
Contact person	Anny Kartika Sari, S.Si., M.Sc., Ph.D
Lecturer	Anny Kartika Sari, S.Si., M.Sc., Ph.D Moh. Edi Wibowo, S.Kom., M.Kom., Ph.D
Language	Bahasa Indonesia and English
Relation to curriculum	1. Undergraduate degree program; mandatory; 3 <sup>rd</sup> semester. 2. International undergraduate program; mandatory; 3 <sup>rd</sup> semester.
Type of teaching, contact hours	1. Undergraduate degree program: lectures, < 60 students 2. International undergraduate program: lectures, < 30 students
Workload	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 (cr).
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.
Recommended prerequisites	Analysis of Algorithms and Complexity

Learning outcomes and their corresponding PLOs	LO	Description	Supported PLO
	LO-1	Students are able to explain and use the techniques of algorithm design using greedy algorithm and dynamic programming approach.	PLO3
	LO-2	Students are able to explain, analyse and determine the complexity of several algorithms related to graphs and.	PLO3
	LO-3	Students are able to apply algorithms related to graphs to solve computational problems.	PLO4
	LO-4	Students are able to explain, analyse and determine the complexity of several advanced and complex data structure.	PLO3
	LO-5	Students are able to use advanced data structure to solve computational problems.	PLO4
	LO-6	Students are able to explain and use several algorithms in special topics to solve computational problems.	PLO5
Content	In this course, students will be introduced with several techniques for algorithm designs, several algorithms related to graph theory, and advanced data structures which needs complex analysis and design. The last part of this course discusses special topics which are considered as advanced and in-depth topics. This includes the topics related to modern and up-to date algorithms which are used often to solve problems with high complexity.		
Study and examination requirements and forms of examination	Assignments, Mid-terms examination and Final examination.		
Media employed	LCD, whiteboard, websites, handouts		

Assessments and Evaluation	LO	Evaluation Method	Type	Percentage	Total
	LO-1	Assignment 1	Formative	5%	15%
		Question no 1 in midterm exam	Summative	10%	
	LO-2	Question no 2 in midterm exam	Summative	10%	10%
	LO-3	Question no 3 in midterm exam	Formative	10%	25%
		Question no 4 in midterm exam	Formative	10%	
		Assignment 2	Summative	5%	
	LO-4	Question no 1 in final exam	Summative	10%	10%
	LO-5	Assignment 3	Formative	5%	15%
		Question no 2 in final exam	Formative	10%	
LO-6	Assignment 4	Formative	5%	25%	
	Question no 3 in final exam	Summative	10%		
	Question no 4 in final exam	Summative	10%		
Reading List	Cormen, et.al., Introduction to Algorithms, 3rd Edition, MIT Press/McGraw-Hill, 2009 Dasgupta, S., et.al., Algorithms, McGraw-Hill, 2006 Wegener, I., Complexity Theory: Exploring the Limits of Efficient Algorithms, Springer, 2005				