

GAU, Faculty of Engineering

Course Unit Title	Analysis of Algorithms	
Course Unit Code	CEN457	
Type of Course Unit	Technical Elective, Computer Engineering Students	
Level of Course Unit	4 th Year BSc	
National Credits	3	
Number of ECTS Credits Allocated	6 ECTS	
Theoretical (hour/week)	3	
Practice (hour/week)	-	
Laboratory (hour/week)	-	
Year of Study	4	
Semester when the course unit is delivered	7/8	
Mode of Delivery	Face to Face	
Language of Instruction	English	
Prerequisites and co-requisites	ENG203 - Computer Programming II	
Recommended Optional Programme Components	Basic background Computer Programming and Data Structures	
Objectives of the Course:		
<ul style="list-style-type: none"> ➤ To introduce the performance issues of algorithms ➤ To teach divide and conquer, dynamic programming and greedy approaches ➤ To improve implementation abilities ➤ To teach advanced algorithm design 		
Learning Outcomes		
When this course has been completed the student should be able to		Assesment.
1	Learn good principles of algorithm design;	1
2	Analyze the resource complexity of an existing algorithm.	1,2
3	Become familiar with fundamental data structures and with the manner in which these data structures can best be implemented;	1
4	Distinguish between Divide and Conquer, Greedy approaches and Dynamic Programming approaches for a problem.	1
5	Design an algorithm for a problem.	1,2,3
6	Code and apply an algorithm for a problem.	1,2,3
Assesment Methods: 1. Written Exam, 2. Assignment 3. Project/Report, 4.Presentation, 5 Lab. Work		
Course's Contribution to Program		
		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	4
2	Ability to design and conduct experiments as well as to analyze and interpret data	4
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	1
4	Ability to apply systems thinking in problem solving and system design	5
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	1
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	4
7	Ability to express their ideas and findings, in written and oral form	1
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	4
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	3
10	To apply fundamental concepts of software design, database design, data processing and artificial intelligence in the modeling, designing, implementing, testing and deploying software solutions.	5
11	Ability to analyse and design hardware systems by applying the principles of embedded systems, microprocessors, computer networks, distributed systems and data communication.	4
CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate 4: High, 5:Very High)		

Course Contents			
Week			Exams
1	Chapter 1	Introduction	
2		Design Principles	
3	Chapter 2	Recursion	
4		Recursion	
5	Chapter 3	Sorting	
6		Recursive Sorting	
7			Midterm
8	Chapter 4	Dynamic Programming (DP)	
9		DP-Knapsack Alg.	
10		DP-Longest Common Subsequence Alg.	
11		DP-Matrix Chain Multiplication Alg.	
12	Chapter 5	Greedy Algorithms	Quiz
13		Greedy Algorithms	
14		Greedy Algorithms	
15			Final
Recommended Sources			
Textbook: T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, "Introduction to Algorithms", MIT Press, 3 rd Edition, 2009			
Supplementary Material (s): Anany Levitin, "The Design & Analysis of Algorithms", Pearson-Addison Wesley, 2 nd Edition, 2007.			
Assessment			
Attendance	10%	Less than 25% class attendance results in NG grade.	
Laboratory	-		
Midterm Exam	30%	Written Exam	
Quiz	20%	Written Exam	
Final Exam	40%	Written Exam	
Total	100%		
ECTS Allocated Based on the Student Workload			
Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including the Exam week)	15	3	45
Labs and Tutorials	-	-	-
Assignments	-	-	-
Project/Presentation/Report Writing	5	4	20
E-learning Activities	-	-	-
Quizzes	1	15	15
Midterm Examination	1	15	15
Final Examination	1	15	15
Self Study	15	4	60
Total Workload			170
Total Workload/30 (h)			5.6
ECTS Credit of the Course			6