

COURSE INFORMATION					
Course Title	Code	Semester	L+P+L Hour	Credits	ECTS
Algorithms	CIS 504		3 + 0 + 0	3	10

Prerequisites	-
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Language of Instruction	English
Course Level	Master's Degree
Course Type	Core
Course Coordinator	Dr. Öğr. Üyesi Engin Kandiran
Instructors	Prof. Dr. Bekir Tevfik Akgün, Prof. Dr. Haluk Bingöl, Dr. Öğr. Üyesi Engin Kandiran
Assistants	
Goals	This course introduces a second programming language and uses it to teach students how to analyze and design algorithms and measure their complexities.
Content	Introduction to Python as a second language to Java. Design and analysis of algorithms, O-notation. Searching, sorting, graph algorithms.

Learning Outcomes	Programme Learning Outcomes	Teaching Methods	Assessment Methods
1) Analyze and design algorithms and measure their complexities	3,4	1,2,3	A,C
2) Recognize the theoretical foundations of the algorithms	3,4	1,2,3,4	A,E
3) Develop efficient algorithms for the solution of real-life computational problems.	3,4	1,4	A,E
4) Implement algorithms.	3,4	1,4	A,E
5) Analyzes searching and sorting algorithms.	3,4	1,2,4	A,C,E
6) Learn fundamentals of python programming language	3,4	1,2,4	A,C,E

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 4: Lab Work
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Assessment Methods:

A: Testing, B: Presentation, C: Homework, D: Project, E: Laboratory

COURSE CONTENT

Week	Topics	Study Materials
1	Python for Java programmers.	
2	Data Structures in Python	
3	Growth of Functions (Complexity measures (Big-O))	
4	Divide and Conquer Approach	
5	Sorting Algorithms (Insertion Sort, Merge Sort)	
6	Sorting Algorithms (Quick Sort, Heap Sort)	
7	Searching Algorithms (Linear Search, Binary Search)	
8	Hashing and Hash Tables	
9	Midterm	
10	Searching Algorithms (Binary Search Trees, Red Black Trees)	
11	Dynamic Programming	
12	Greedy Algorithms	
13	Elementary Graph Algorithms	
14	Graph Algorithms and NP Completeness	
15	Final	

RECOMMENDED SOURCES**Textbook**

1-Lecture Notes

Additional Resources1-*Introduction to Algorithms*, 4th Edition, Cormen, Leiserson, Rivest, Stein; MIT Press 2022.2-*Java tutorials*, (<https://docs.oracle.com/javase/tutorial/>), Oracle.
Start Out with Python, Global Edition, (4. edition), Gaddis, Pearson, 2021.**MATERIAL SHARING****Documents****Assignments****Exams**

ASSESSMENT		
IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-Term	1	40
Quizzes	1	20
Homeworks	10	40
Total		100
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		60
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		40
Total		100

COURSE CATEGORY	Expertise/Field Courses
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COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Students have the knowledge and the skills to design and develop the complete systems for multi-media visual user interface.	X				
2	Students have advanced the knowledge and skills to design, develop and install the application systems for multimedia.					
3	Students have the knowledge and the skills to design, develop and apply algorithms and data structures to solve the basic problems of information processing, within the framework of discrete mathematics.				X	
4	Students have the knowledge and the skills to design and develop computer applications, based on user specified requirements, using modern structured development tools and install them on various hardware platforms and deploy their usage.				X	
5	Students have the knowledge and the skills to design and develop computer applications, based on user specified requirements, using modern object-oriented development tools and install them on various hardware platforms and deploy their usage.			X		
6	Students know the logic of computer operating systems, the basic set of system commands, how to control access to system resources by users of different departments and how to monitor the running of jobs in the system.				X	
7	Students have the knowledge and the skills to design and develop data models serving different requirements, database applications that would				X	

	access and process data using various types of software, including queries, reports and business applications.	
8	Students have the knowledge and the skills to design and develop business applications that would provide data access, modification and processing for data kept in enterprise database systems.	X
9	Students have the knowledge about computer networks, and have the skills to design, develop and monitor computer networks, how to configure them and how to maintain their performance.	
10	Students have the knowledge and the skills to design and develop visual user interfaces for the web, web-based applications for n-tier client/server configurations, how to deploy them in enterprises.	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 15x Total course hours/week)	14	3	42
Hours for off-the-classroom study (Pre-study, practice, review/week)	14	5	70
Homework	10	10	100
Quizzes	10	1	10
Midterm	1	10	10
Final	1	10	10
Total Work Load			242
Total Work Load / 25 (h)			9.6
ECTS Credit of the Course			10