

TISHK INTERNATIONAL UNIVERSITY
FACULTY OF SCIENCE
Department of INFORMATION TECHNOLOGY,
2021-2022 Fall
Course Information for IT 317 DATA STRUCTURES AND ALGORITHMS I

Course Name: DATA STRUCTURES AND ALGORITHMS I					
Code IT 317	Regular Semester 5	Theoretical 2	Practical 2	Credits 3	ECTS
Name of Lecturer(s)- Academic Title: Savriddin Halil - MSc					
Teaching Assistant: Lilaf Baker					
Course Language: English					
Course Type: Main					
Office Hours Tuesday					
Contact Email: savriddin.halil@tiu.edu.iq Tel:0000					
Teacher's academic profile: BSc Degree in Software Engineering. MSc Degree in Software Engineering. IT Department Head.					
Course Objectives: Study of the basics of algorithms and their implementations: Bubble Sort, Selection Sort, Insertion Sort, Binary Search, Recursive Programming, Merge Sort, Quick Sort. Basic analysis of algorithms and big-O notation. Stack and Queue data structures.					
Course Description (Course overview): The purpose of this course is to provide the students with solid foundations in the basic concepts of programming: data structures and algorithms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter. This course is also about showing the correctness of algorithms and studying their computational complexities. This course offers the students a mixture of theoretical knowledge and practical experience.					

COURSE CONTENT

Week	Hour	Date	Topic
1	2	4-7/10/2021	Intro. Algorithmic problems and solutions.
2	2	10-14/10/2021	Max, Min and Needed values of the set.
3	2	17-21/10/2021	Pseudo-code and usage.
4	2	24-28/10/2021	Bubble Sort. Iteration and steps.
5	2	31/10-4/11/2021	Selection Sort. Iteration and steps.
6	2	7-11/11/2021	Insertion Sort. Iteration and steps.
7	2	14-18/11/2021	Midterm Exam
8	2	21-25/11/2021	Big-O Notation.
9	2	28/11-2/12/2021	Recursive Programming.
10	2	5-9/12/2021	Binary Search.
11	2	12-16/12/2021	Merge Sort. Iteration and steps.
12	2	19-23/12/2021	Quick Sort. Iteration and steps.
13	2	26-30/12/2021	Stack data structure.
14	2	2-5/1/2022	Queue data structure.
15	2	9-13/1/2022	Final Exam
16	2	16-20/1/2022	Final Exam

COURSE/STUDENT LEARNING OUTCOMES

- 1 Analyze the time complexity of simple algorithms with loops and conditionals.
- 2 Analyze the time complexity of simple recursive methods.

3	Compare the time complexity of two or more alternate algorithms.																																																												
4	Analysis of algorithms in terms of big-O notation.																																																												
5	Solution for mathematical and real life problems.																																																												
COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES (Blank : no contribution, I: Introduction, P: Profecient, A: Advanced)																																																													
Program Learning Outcomes																																																													
	Cont.																																																												
1	Analyze a problem, and identify the computing requirements appropriate to its solution	A																																																											
2	Design, implement, and evaluate computer-based systems, process, component, or program to meet desired needs	I																																																											
3	Function effectively in teams to accomplish a common goal																																																												
4	Identify professional, ethical, legal, security, social, and economic issues and responsibilities																																																												
5	Analyze the local and global impact of computing on individuals, organizations, and society	P																																																											
6	Use current techniques, skills, and tools necessary for computing practice	I																																																											
7	Apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking, web systems and technologies																																																												
8	Identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems																																																												
9	Effectively integrate it-based solutions into the user environment																																																												
10	Apply problem solving skills, core it concepts, best practices and standards to information technologies	P																																																											
11	Identify and evaluate organizational requirements and current and emerging technologies																																																												
12	Design and integrate it-based solutions into the organizational environment																																																												
Prerequisites (Course Reading List and References):	IT-203 Programming I: Fundamental knowledge in programming as: loops, conditionals, functions, file in/out.																																																												
Student's obligation (Special Requirements):	1.Be in to the lectures on-time. 2.Repeat lecture notes at home after each lecture. 3.Submit assignments on time. 4.Do not do any action which disturbs class. 5.No chewing, no eating and no drinking (except water) during class.																																																												
Weekly Laboratory/Practice Plan:	<table border="1"> <thead> <tr> <th>Week</th> <th>Hour</th> <th>Date</th> <th>Topics</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2</td> <td>4-7/10/2021</td> <td>Arrays. Linear Search. Assignment 1: Search backward needed element.</td> </tr> <tr> <td>2</td> <td>2</td> <td>10-14/10/2021</td> <td>Arrays. Linear Search. Assignment 1: Search backward needed element.</td> </tr> <tr> <td>3</td> <td>2</td> <td>17-21/10/2021</td> <td>Array max, min elements. Assignment 2: Find minimum element.</td> </tr> <tr> <td>4</td> <td>2</td> <td>24-28/10/2021</td> <td>Bubble Sort. Assignment 3: Sort data from file.</td> </tr> <tr> <td>5</td> <td>2</td> <td>31/10-4/11/2021</td> <td>Selection Sort. Assignment 4: Sort data in inverse order. Display variable values.</td> </tr> <tr> <td>6</td> <td>2</td> <td>7-11/11/2021</td> <td>Insertion Sort. Assignment 5: Sort data in inverse order. Display variable values.</td> </tr> <tr> <td>7</td> <td>2</td> <td>14-18/11/2021</td> <td>Midterm.</td> </tr> <tr> <td>8</td> <td>2</td> <td>21-25/11/2021</td> <td>Big O notation. Time complexity. Assignment 6: Compare B.I.S. sorts</td> </tr> <tr> <td>9</td> <td>2</td> <td>28/11-2/12/2021</td> <td>Recursive Programming. Lab Exam 1. Assignment 7: Recursive exercises.</td> </tr> <tr> <td>10</td> <td>2</td> <td>5-9/12/2021</td> <td>Binary Search.</td> </tr> <tr> <td>11</td> <td>2</td> <td>12-16/12/2021</td> <td>Recursive sorting algorithms. Merge Sort. Assignment 8: Sort data from file.</td> </tr> <tr> <td>12</td> <td>2</td> <td>19-23/12/2021</td> <td>Quick Sort. Assignment 9: Compare B., I., S., M., Q. sorts. Time complexity.</td> </tr> <tr> <td>13</td> <td>2</td> <td>26-30/12/2021</td> <td>Stacks. Queues.</td> </tr> <tr> <td>14</td> <td>2</td> <td>2-5/1/2022</td> <td>Lab Exam. Revision.</td> </tr> </tbody> </table>	Week	Hour	Date	Topics	1	2	4-7/10/2021	Arrays. Linear Search. Assignment 1: Search backward needed element.	2	2	10-14/10/2021	Arrays. Linear Search. Assignment 1: Search backward needed element.	3	2	17-21/10/2021	Array max, min elements. Assignment 2: Find minimum element.	4	2	24-28/10/2021	Bubble Sort. Assignment 3: Sort data from file.	5	2	31/10-4/11/2021	Selection Sort. Assignment 4: Sort data in inverse order. Display variable values.	6	2	7-11/11/2021	Insertion Sort. Assignment 5: Sort data in inverse order. Display variable values.	7	2	14-18/11/2021	Midterm.	8	2	21-25/11/2021	Big O notation. Time complexity. Assignment 6: Compare B.I.S. sorts	9	2	28/11-2/12/2021	Recursive Programming. Lab Exam 1. Assignment 7: Recursive exercises.	10	2	5-9/12/2021	Binary Search.	11	2	12-16/12/2021	Recursive sorting algorithms. Merge Sort. Assignment 8: Sort data from file.	12	2	19-23/12/2021	Quick Sort. Assignment 9: Compare B., I., S., M., Q. sorts. Time complexity.	13	2	26-30/12/2021	Stacks. Queues.	14	2	2-5/1/2022	Lab Exam. Revision.
Week	Hour	Date	Topics																																																										
1	2	4-7/10/2021	Arrays. Linear Search. Assignment 1: Search backward needed element.																																																										
2	2	10-14/10/2021	Arrays. Linear Search. Assignment 1: Search backward needed element.																																																										
3	2	17-21/10/2021	Array max, min elements. Assignment 2: Find minimum element.																																																										
4	2	24-28/10/2021	Bubble Sort. Assignment 3: Sort data from file.																																																										
5	2	31/10-4/11/2021	Selection Sort. Assignment 4: Sort data in inverse order. Display variable values.																																																										
6	2	7-11/11/2021	Insertion Sort. Assignment 5: Sort data in inverse order. Display variable values.																																																										
7	2	14-18/11/2021	Midterm.																																																										
8	2	21-25/11/2021	Big O notation. Time complexity. Assignment 6: Compare B.I.S. sorts																																																										
9	2	28/11-2/12/2021	Recursive Programming. Lab Exam 1. Assignment 7: Recursive exercises.																																																										
10	2	5-9/12/2021	Binary Search.																																																										
11	2	12-16/12/2021	Recursive sorting algorithms. Merge Sort. Assignment 8: Sort data from file.																																																										
12	2	19-23/12/2021	Quick Sort. Assignment 9: Compare B., I., S., M., Q. sorts. Time complexity.																																																										
13	2	26-30/12/2021	Stacks. Queues.																																																										
14	2	2-5/1/2022	Lab Exam. Revision.																																																										

	15	2	9-13/1/2022	Final Exam.	
	16	2	16-20/1/2022	Final Exam.	
Course Book/Textbook:	-Elliot B.Koffman, Paul A.T.Wolfgang 'Objects, Abstraction, and Design Using C++. - D.S.Malik - C++ Programming. From problem Analysis to program design, 6th edition, 2014. - Robert Sedgewick and Kevin Wayne - Algorithms, 4th edition, 2011. - Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein - Introduction to Algorithms, Third Edition - 2009. - Data Structures and Algorithms in C++, 2nd edition, Adam Drozdek, 2001.				
Other Course Materials/References:	Presentation files, Sample codes, Demonstration.				
Teaching Methods (Forms of Teaching):	Lectures, Practical sessions, Exercises, Presentation, Assignments, Demonstration, , ,				
COURSE EVALUATION CRITERIA					
Method			Quantity	Percentage (%)	
Quiz			2	5	
Homework			15	1	
Midterm Exam			1	20	
Practical Exam			1	15	
Final Exam			1	40	
Total				100	
Examinations: Essay Questions, Short Answers, Matching, , ,					
Extra Notes:					
ECTS (ALLOCATED BASED ON STUDENT) WORKLOAD					
Activities			Quantity	Workload Hours for 1 quantity*	Total Workload
Theoretical Hours			16	2	32
Practical Hours			16	2	16
Final Exam			1	8	8
Quiz			2	4	8
Homework			15	4	60
Midterm Exam			1	4	4
Practical Exam			1	8	8
Total Workload					136
ECTS Credit (Total workload/25)					5.44

Peer review

Signature:

Name:

Lecturer

Signature:

Name:

Head of Department

Signature:

Name:

Dean