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| **ISHIK UNIVERSITY FACULTY OF SCIENCE Department of INFORMATION TECHNOLOGY,2017-2018 Spring Course Information for IT 317 DATA STRUCTURES AND ALGORITHMS I** |

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| --- | --- |
| **Course Name:** | DATA STRUCTURES AND ALGORITHMS I |
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| --- | --- | --- | --- | --- | --- | --- |
| **Code** | **Course type** | **Regular Semester** | **Theoretical** | **Practical** | **Credits** | **ECTS** |
| IT 317 | 2 | 5 | 2 | 2 | 3 |  |

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| **Name of Lecturer(s)-Academic Title:** | Savriddin Halil - MSc |
| **Teaching Assistant:** | - |
| **Course Language:** | English |
| **Course Type:** | Non-area Elective |
| **Office Hours** | Thursday after 14:00  |
| **Contact:** | Email:savriddin.halil@ishik.edu.iq Tel:-  |
| **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. |
| **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 | 8-12/10/2017 | Arrays. Linear Search. Assignment 1: Search backward needed element. |
| **2** | 2 | 15-19/10/2017 | Array max, min elements. Assignment 2: Find minimum element. |
|  |  |  |  |
| **3** | 2 | 22-26/10/2017 | Bubble Sort. Assignment 3: Sort data from file. |
| **4** | 2 | 29/10-2/11/2017 | Selection Sort. Assignment 4: Sort data in inversed order. Display variable values. |
|  |  |  |  |
| **5** | 2 | 5-9/11/2017 | Insertion Sort. Assignment 5: Sort data in inversed order. Display variable values. |
| **6** | 2 | 12-16/11/2017 | Insertion Sort. Revision |
|  |  |  |  |
| **7** | 2 | 19-23/11/2017 | Midterm Exam |
| **8** | 2 | 26-30/11/2017 | Big O notation. Time complexity. Assignment 6: Compare B.I.S. sorts |
|  |  |  |  |
| **9** | 2 | 3-7/12/2017 | Binary Search. Recursive Programming. Assignment 7: Recursive exercises. |
| **10** | 2 | 10-14/12/2017 | Recursive sorting algorithms. Merge Sort. Assignment 8: Sort data from file. |
|  |  |  |  |
| **11** | 2 | 17-21/12/2017 | Quick Sort. Assignment 9: Compare B., I., S., M., Q. sorts. Time complexity. |
| **12** | 2 | 24-28/12/2017 | ? |
|  |  |  |  |
| **13** | 2 | 31/12/2017-4/1/2018 | Queues. Assignment 11: Inert elements in sorted order. |
| **14** | 2 | 7-11/1/2018 | Laboratory exam (open book). |
|  |  |  |  |
| **15** | 2 | 14-18/1/2018 | Final Exam |
| **16** | 2 | 21-25/1/2018 | Final Exam |
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| **COURSE/STUDENT LEARNING OUTCOMES**

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| **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** | Solutin for mathematical and real life roblems. |

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| **COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES**(Blank : no contribution, I: Introduction, P: Profecient, A: Advanced )

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| --- | --- | --- |
|  | **Program Learning Outcomes** | **Cont.** |
| **1** | An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution | A |
| **2** | An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs | I |
| **3** | An ability to function effectively on teams to accomplish a common goal | I |
| **4** | An understanding of professional, ethical, legal, security, social, and economic issues and responsibilities | I |
| **5** | An ability to analyze the local and global impact of computing on individuals, organizations, and society | P |
| **6** | An ability to use current techniques, skills, and tools necessary for computing practice | I |
| **7** | An ability to use and apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking, web systems and technologies | I |
| **8** | An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems | I |
| **9** | An ability to effectively integrate IT-based solutions into the user environment | I |
| **10** | An ability apply problem solving skills, core IT concepts, best practices and standards to information technologies | P |
| **11** | An ability to identify and evaluate organizational requirements and current and emerging technologies | I |
| **12** | An ability to select, design, integrate and administer IT-based solutions into the organizational environment | I |

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| **Prerequisites (Course Reading List and References):** | 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 it 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:** |

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| --- | --- | --- | --- |
| **Week** | **Hour** |               **Date**               | **Topics** |
| 1 | 2 | 8-12/10/2017 | Intro to course. Arrays. |
| 2 | 2 | 15-19/10/2017 | Array max, min elements. Pseudo Code. Assignment 1: Pseudo code. |
|  |  |  |  |
| 3 | 2 | 22-26/10/2017 | Sorting Algorithms. Big O notation. Bubble Sort. Assignment 2: Pseudo code. |
| 4 | 2 | 29/10-2/11/2017 | Selection Sort. Assignment 3: Pseudo code |
|  |  |  |  |
| 5 | 2 | 5-9/11/2017 | Quiz 1. Insertion Sort. Assignment 4: Pseudo code |
| 6 | 2 | 12-16/11/2017 | Insertion Sort. Revision. |
|  |  |  |  |
| 7 | 2 | 19-23/11/2017 | Midterm Exam |
| 8 | 2 | 26-30/11/2017 | Big O notation. Time complexity. |
|  |  |  |  |
| 9 | 2 | 3-7/12/2017 | Binary search. Recursive programming. |
| 10 | 2 | 10-14/12/2017 | Recursive sorting algorithms. Merge Sort. |
|  |  |  |  |
| 11 | 2 | 17-21/12/2017 | Quick Sort. |
| 12 | 2 | 24-28/12/2017 | Data Structures. Stacks. |
|  |  |  |  |
| 13 | 2 | 31/12/2017-4/1/2018 | Quiz 2. Queues. |
| 14 | 2 | 7-11/1/2018 | Revision. |
|  |  |  |  |
| 15 | 2 | 14-18/1/2018 | Final Exam |
| 16 | 2 | 21-25/1/2018 | Final Exam |
|  |  |  |  |

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| **Course Book/Textbook:** | -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, Excersises, Presentation, Assignments, Demonstration |
| **COURSE EVALUATION CRITERIA**

|  |  |  |
| --- | --- | --- |
| **Method** | **Quantity** | **Percentage (%)** |
| Quiz | 1 | 10 |
| Homework | 1 | 15 |
| Midterm Exam(s) | 1 | 20 |
| Lab/Practical Exam(s) | 1 | 15 |
| Final Exam | 1 | 40 |
| **Total** | **100** |
| **Examinations:**Essay Questions, Fill in the Blanks, Short Answers |  |  |

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| **Extra Notes:** |
| **ECTS (ALLOCATED BASED ON STUDENT) WORKLOAD**

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| --- | --- | --- | --- |
| **Activities** | **Quantity** | **Duration (Hour)** | **Total Work Load** |
| Course Duration (Including the exam week: 16x Total course hours) |  |  | 0 |
| Hours for off-the-classroom study (Pre-study, practice) |  |  | 0 |
| Assignments Mid-terms |  |  | 0 |
| Final examination |  |  | 0 |
| Other |  |  | 0 |
| **Total Workload** | **0** |
| **ECTS Credit (Total workload/25)** | **0** |

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**Peer review**

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| --- | --- | --- |
| Signature: | Signature: | Signature: |
| Name: | Name: | Name: |
| Lecturer                                                                       | Head of Department                                                         | Dean |

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