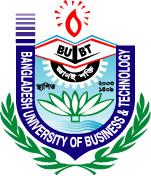
**Bangladesh University of Business & Technology (BUBT)**

**Department of Computer Science and Engineering (CSE)**



Program : B.Sc. Engineering in CSE

Course Code : CSE 242

Course Title : Algorithms Lab

Course Credit : 1.5

Contact Hours : 3hrs

Semester : Summer 2019

Intake : 38th [Shift: Day]

Section : 01

**Sessional Primitives**

1. **Course Objectives**

The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.

1. **Course Outcomes**

Upon successful completion of this course, students should be able to:

|  |  |
| --- | --- |
| **CO1** | **Understand** and **Implement** basic algorithms such as sorting, searching etc. |
| **CO2** | **Analyze** the performance of the algorithms and runtime complexity of the algorithms for the same problem. |
| **CO3** | **Design** and **apply** efficient algorithms using advanced problem-solving techniques. |
| **CO4** | **Develop** computer programs or algorithms for the solution of complex engineering problems using the basic and advanced problem-solving techniques. |

1. **Mapping of Course Outcomes (COs) to Program Outcomes (POs)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sl. No. | COs | Corresponding POs | Bloom’s taxonomy domain/level | Delivery methods and activities | Assessment tools |
| 1 | **Understand** and **Implement** basic algorithms such as sorting, searching etc. | PO1 | Apply | Lab instruction and Lab task | Task Evaluation, Lab test |
| 2 | **Analyze** the performance of the algorithms and runtime complexity of the algorithms for the same problem. | PO2 | Analyze | Lab instruction and Lab task | Task Evaluation, Lab test |
| 3 | **Design** and **apply** efficient algorithms using advanced problem-solving techniques. | PO3 | Design/Development | Lab instruction and Lab task | Task Evaluation, Lab test |
| 4 | **Develop** computer program or algorithms for the solution of complex engineering problem using the basic and advanced problem-solving techniques. | PO7 | Understand/Demonstrate | Lab instruction and Lab task | Task Evaluation, Lab test |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | √ |  |  |  |  |  |  |  |  |  |  |  |
| CO2 |  | √ |  |  |  |  |  |  |  |  |  |  |
| CO3 |  |  | √ |  |  |  |  |  |  |  |  |  |
| CO4 |  |  |  |  |  |  | √ |  |  |  |  |  |

1. **Descriptions of Program Outcomes (POs)**

|  |  |
| --- | --- |
| PO1 | **Engineering Knowledge (Cognitive):** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems. |
| PO2 | **Problem Analysis (Cognitive):** Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences. |
| PO3 | **Design/Development of Solutions (Cognitive, Affective):** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns. |
| PO4 | **Investigation (Cognitive, Psychomotor):** Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions. |
| PO5 | **Modern Tool Usage (Psychomotor, Cognitive):** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| PO6 | **The Engineer and Society (Affective):** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice. |
| PO7 | **Environment and Sustainability (Affective, Cognitive):** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development. |
| PO8 | **Ethics (Affective):** Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice. |
| PO9 | **Individual Work and Teamwork (Psychomotor, Affective):** Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings. |
| PO10 | **Communication (Psychomotor, Affective):** Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions. |
| PO11 | **Project Management and Finance (Cognitive, Psychomotor):** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work as a member or a leader of a team to manage projects in multidisciplinary environments. |
| PO12 | **Life-Long Learning (Affective, Psychomotor):** Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change. |

1. **Requirements**

The following specifications are needed for conducting this course:

* Personal Computer
* CodeBlocks 16.01
* Turbo C++, Borland C++
* Microsoft Windows SDK.
* Internet Explorer/Google Chrome/Mozilla Firefox or any suitable browser

1. **Course Evaluation**

|  |  |  |
| --- | --- | --- |
| **Class Attendance** | : | 10% |
| **Lab Report** | : | 10% |
| **Class Test** | : | 10% |
| **Mid Term Exam/**  **Project/Term Work** | : | 30% |
| **Final Evaluation** | : | 40% |
| **Grades** | | | |
| **Numerical Grade** | **Letter Grade** | | **Grade Point** |
| 80% and above | A+ | (A Plus) | 4.00 |
| 75% to less than 80% | A | (A Regular) | 3.75 |
| 70% to less than 75% | A- | (A Minus) | 3.50 |
| 65% to less than 70% | B+ | (B Plus) | 3.25 |
| 60% to less than 65% | B | (B Regular) | `3.00 |
| 55% to less than 60% | B- | (B Minus) | 2.75 |
| 50% to less than 55% | C+ | (C Plus) | `2.50 |
| 45% to less than 50% | C | (C Regular) | 2.25 |
| 40% to less than 45% | D |  | 2.00 |
| Less than 40% | F |  | 0.00 |

1. **Weekly Schedule**

|  |  |
| --- | --- |
| Week1 | **Searching and Sorting :**[Linear Search](http://quiz.geeksforgeeks.org/linear-search/), [Binary Search](http://geeksquiz.com/binary-search/), Insertion Sort, Selection Sort |
| Week2 | **Divide and Conquer:** Merge Sort, Quick Sort |
| Week3 | **Divide and Conquer:** Heap Sort, [Closest Pair of Points](https://www.geeksforgeeks.org/closest-pair-of-points/), [Count Inversions](https://www.geeksforgeeks.org/counting-inversions/) etc. |
| Week4 | **Greedy Algorithms:** Fractional Knapsack , Activity Selection Problem |
| Week5 | **Greedy Algorithms:** Huffman Coding, Job Sequencing Problem |
| Week6 | **Midterm Examination** |
| Week7 | **Dynamic Programming:** Matrix Chain Multiplication, O-1 Knapsack |
| Week8 | **Dynamic Programming:** Longest Common Subsequence, Longest Increasing Subsequence |
| Week9 | **Dynamic Programming:** Edit Distance, Rod Cutting |
| Week10 | **Graph Algorithms:** Breadth First Search, Depth First Search |
| Week11 | **Minimum Spanning Tree:** Prims Algorithm, Kruskal’s Algorithm |
| Week12 | **Shortest Paths:** [Dijkstra’s Shortest Path Algorithm](https://www.geeksforgeeks.org/greedy-algorithms-set-6-dijkstras-shortest-path-algorithm/), [Floyd Warshall Algorithm](https://www.geeksforgeeks.org/dynamic-programming-set-16-floyd-warshall-algorithm/) |
| Week13 | **Shortest Paths:** Bellman Ford Algorithm, Johnson Algorithm |
| Week 14 | **Final Examination** |

1. **Assessment Scheme**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Assessment Area** | **Course Outcomes** **CO** | | | **Assessment Area Mark** |
|  | **CO1** | **CO2** | **CO3** |  |
| Class Participation |  |  |  | 10 |
| Lab Report |  |  |  | 10 |
| Class Test |  |  |  | 10 |
| Midterm Exam | 10 | 10 | 10 | 30 |
| Final Exam | 10 | 20 | 10 | 40 |
| **Total Mark** | **20** | **30** | **20** | **100** |

1. **Reference Materials**

**Required References** : 1. Introduction to algorithms - cormen

**Recommended References**: 2. Algorithms - Sahni

1. **Instructor Information**

|  |  |
| --- | --- |
| **Instructor :** | **Dr. M Firoz Mridha**  Associate Professor,  Department of Computer Science & Engineering |
| **Office :** | Room No-603 |
| **Phone :** | +8801674791594 |
| **Email :** | firoz@bubt.edu.bd |

1. **Class Schedule**

|  |  |  |
| --- | --- | --- |
| **Day** | **Time** | **Room No** |
| Tuesday | 08:30 AM – 11:40 AM | 417 |

1. **Office Hours**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DAYS** | **8:30-09:30** | **09:35-10:35** | **10:40-11:40** | **11:45-12:45** | **12:45- 01:15** | **01:15-02:15** | **02:20-03:20** | **03:25-04:25** | **04.30-05:30** | **06.00-07:30** | **07:45-09:15** |
| **SAT** | **DAY OFF** | | | | | | | | | | |
| **SUN** | CSE 352 | CSE 352 | CSE 352 | CSE 241 | **Office**  **Hour** | **Office**  **Hour** | **Office**  **Hour** |  |  |  |  |
| **MON** | **Office**  **Hour** | CSE 241 | CSE 351 | **Office**  **Hour** | **Office**  **Hour** | **Office**  **Hour** | **Office**  **Hour** |  |  |  |  |
| **TUE** | CSE 242 | CSE 242 | CSE 242 | CSE 351 | **Office**  **Hour** | **Office**  **Hour** | **Office**  **Hour** |  |  |  |  |
| **WED** | CSE 351 | CSE 241 | **Office**  **Hour** | **Office**  **Hour** | **Office**  **Hour** | **Office**  **Hour** | **Office**  **Hour** |  |  |  |  |
| **FRI** |  |  |  |  |  |  |  |  |  | 6:00-7:30PM  CSE 313 | 7:30-9:00PM  CSE 313 |

**Prepared by: Checked by: Approved by:**

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