**COURSE OUTLINE**

**Course Code: CSE 204**

**Course Title: Data Structures** **and Algorithms I Sessional**

**Level/Term: 2/1 Section: A+B**

**Academic Session: January 2017**

**Course Teacher(s):**

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| --- | --- | --- | --- |
| **Name:** | **Initial** | **Office/Room:** | **E-mail and Telephone: (optional)** |
| Dr. Muhammad Masroor Ali | MMA |  |  |
| Dr. Md. Abul Kashem Mia | MAK | ECE 315 |  |
| Sukarna Barua | SB | ECE 209 | 01674 069126 |
| Atif Hasan Rahman | AHR | ECE 519 | atif.bd@gmail.com |
| Siddhartha Shankar Das | SSD |  |  |
| Md. Iftekharul Islam Sakib | MDIIS |  |  |
| Madhusudan Basak | MB |  |  |

**Course Outline:**

Internal data representation; Abstract data types; Introduction to algorithms; Asymptotic analysis: growth of functions, O, Ω and Θ notations; Correctness proof and techniques for analysis of algorithms; Master Theorem; Elementary data structures: arrays, linked lists, stacks, queues, trees and tree traversals, graphs and graph representations, heaps, binary search trees; Graph Traversals: DFS, BFS, Applications of DFS and BFS; Sorting: heap sort, merge sort, quick sort; Data structures for set operations; Methods for the design of efficient algorithms: divide and conquer, greedy methods, dynamic programming.

**Learning Outcomes/Objectives:**

After undergoing this course, students should be able to:

1. design, analyze, and implement basic data structures such as arrays, lists, stacks, queues, trees, and graphs
2. design, analyze, and implement some advanced data structures such as heaps
3. assess data structure impacts on the performance of an application
4. compare between several data structures and choose the best one for specific application
5. learn basic graph algorithms and their applications
6. learn sorting algorithms
7. formulate problems and solve them using greedy method, divide and conquer, dynamic programming

**Assessment**

Homework Assignments: 50-60%

Online Assignments: 20-30%

Quiz : 20-30%

**Text and Reference books:**

1. Introduction to Algorithms, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press, 3rd Edition
2. Algorithm Design , by Jon Kleinberg and Eva Tardos, Pearsons Publishers
3. Data Structures and Algorithm Analysis, Edition 3.2 (C++ Version) by Clifford A. Shaffer
4. Data Structures and Algorithms in C++, Second Edition by Michael T., Roberto Tamassia and David M. Mount
5. Algorithms, by Sanjoy Dasgupta, Christos Papadimitriou and Umesh Vazirani

**Weekly schedule:**

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| **Week** | **Topics** | **Teacher’s Initial** |
| Week 1 | Introduction |  |
| Week 2 | Homework and Online Assignment on ArrayList |  |
| Week 3 | Homework and Online Assignment on LinkedList |  |
| Week 4 | Homework and Online Assignment on Stack/Queue |  |
| Week 5 | Homework and Online Assignment on Tree/Binary Search Tree |  |
| Week 6 | Homework and Online Assignment on Heaps |  |
| Week 7 | Homework and Online Assignment on Data Structures for Graphs |  |
| Week 8 | Make up |  |
| Week 9 | Homework and Online Assignment on BFS, DFS and applications |  |
| Week 10 | Homework and Online Assignment on Sorting Algorithms |  |
| Week 11 | Homework and Online Assignment on Divide and Conquer |  |
| Week 12 | Homework and Online Assignment on Greedy Algorithms |  |
| Week 13 | Homework and Online Assignment on Dynamic Programming |  |
| Week 14 | Quiz |  |

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| Prepared by : |  |
| Name:  Signature:  Date: |  |