

**COURSE SYLLABUS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | **Faculty** | Faculty of Science & Engineering | | | |
| 2 | **Department** | Department of CSE | | | |
| 3 | **Program** | B.Sc. in Computer Science & Engineering | | | |
| 4 | **Name of Course** | Data Structures | | | |
| 5 | **Course Code** | CSE 105 | | | |
| 6 | **Trimester and**  **Year** | Spring, 2021 | | | |
| 7 | **Pre-requisites** | CSE 103 | | | |
| 8 | **Status** | Core Course | | | |
| 9 | **Credit Hours** | 3.0 | | | |
| 10 | **Section** | 201DB | | | |
| 11 | **Class Hours** | Tuesday 10:00-11:30, Thursday 10:00-11:30 | | | |
| 12 | **Class Location** | Room: 408 | | | |
| 13 | **Course website** |  | | | |
| 14 | **Name (s) of Academic staff / Instructor(s)** | Ahmed Iqbal Pritom | | | |
| 15 | **Contact** | iqbal.cse@green.edu.bd | | | |
| 16 | **Office** | Room # 502, Campus-2 | | | |
| 17 | **Counselling Hours** | Wednesday 3.30-5:00  Monday 3:30-5:00 | | | |
| 18 | **Text Book** | 1. Mehlhorn, K. (2013). Data structures and algorithms 1: Sorting and searching (Vol. 1). Springer Science & Business Media. 2. Chang, S. K. (Ed.). (2003). Data structures and algorithms (Vol. 13). World Scientific. 3. Goodrich, M. T., &Tamassia, R. (2008). Data structures and algorithms in Java. John Wiley & Sons. 4. Cormen, T. H. (2009). Introduction to algorithms. MIT press. | | | |
| 19 | **Equipment & Aids** | * White Board * Marker * PPTX * Books | | | |
| 20 | **Course Rationale** | Development of application systems and software that use underlying architecture of machines efficiently and effectively requires the ability to use and manipulate various types of Data Structures and other constructs. The course focuses on the common structures used to store data and the standard algorithms for manipulating them. Standard data structures include lists, stacks, queues, trees, heaps, hash tables, and graphs. Standard algorithms include searching, sorting, and traversals. Along with implementation details, students will learn to analyze the time and space efficiency of algorithms and how to select appropriate data structures and algorithms for a specific application. In homework’s, labs and programming projects, students will implement their own data structures and make use of existing libraries to solve a variety of computational problems. | | | |
| 21 | **Course Description** | Data structures play a central role in modern computer science. You interact with data structures even more often than with algorithms. In addition, data structures are essential building blocks in obtaining efficient algorithms. This course covers major results and current directions of research in data structure. | | | |
| 22 | **Course Objectives** | The course is designed to provide the background of the following topics   * To study and apply concepts relating to data structures. * To describe the operations on various data structures. * To discuss the various ways of implementing data structures in different programming languages. | | | |
| 23 | **Learning Outcomes** | 1. Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems; 2. Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations; 3. Analyze, evaluate and choose appropriate abstract data types and algorithms to solve particular problems; 4. Develop algorithms to Insert node from front, to the end, at any position, delete element, insert into sorted list, delete node from singly/doubly linked list. 5. Design and implement C programs that apply abstract data types. 6. Calculate the path length using Huffman algorithm. 7. Propose simple algorithm. 8. Judge the students understanding about topic 9. Judge the students communication capability | | | |
| 24 | **Teaching Methods** | * Lecture * Rapport building * Group work * Demonstration | | | |
| 25 | **Topic Outline** |  | | | |
|  | **Class** | Topics Or  Assignments | **CLOs** | **Reading Reference** | **Activities** |
|  | 1 | Data Structures: Concept of data types, abstract data types. | i |  | Group Discussion.  Question Answer. |
|  | 2 | Arrays: Maximization, ordered lists, sparse matrices representation of arrays. | ii |  | Group Discussion.  Question Answer.  Quiz Test |
|  | 3 | Stacks and Queues: Fundamental, Differential types of stacks and Queues. | ii |  | Group Discussion.  Q/A |
|  | 4 | Recursion: Direct and indirect recursions; simulation of recursion, depth of recursion; removal of recursion  . | iii |  | Group Discussion.  Question Answer.  QUIZ 1 |
|  | 5 | Liked lists: Different types of liked list and their operations. | iii |  | Group Discussion.  Q/A |
|  | 6 | Polynomial Equation: Polynomial equation representation into circular linked list. | iii |  | Group Discussion.  Question Answer. |
|  | 7 | Trees: Basic terminology, binary trees, binary tree representations  Binary tree traversal; Preorder, In-order & Post-order | iii |  | Group Discussion.  Q/A |
|  | 8 | Class Test 1 | viii |  | MCQ  SQ  Discussion |
|  | 9 | Extended binary trees: 2-trees, Internal and external path lengths | iii |  | Group Discussion.  Question Answer. |
|  | 10 | Huffman codes/algorithm for finding minimum weighted path length. | iv, v |  | Group Discussion.  Q/A |
|  | 11 | binary tree representation of trees; application of trees, set representation | v |  | Group Discussion.  Question Answer.  Quiz 2 |
|  | 12 | Graphs: Introduction, definitions and terminology, graph representations. | v |  | Group Discussion.  Q/A |
|  | 13 | MID TERM EXAMINATION | viii |  | MCQ  SQ BQ  LR |
|  | 14 | Connected components and spanning trees | v |  | Group Discussion.  Question Answer. |
|  | 15 | Minimum Spanning Tree & Its application though examples. | vi, vii |  | Group Discussion.  Q/A |
|  | 16 | Prim’s and Krushkal’s Algorithm to find the MST among all possible Spanning Tree | vi, vii |  | Group Discussion.  Question Answer. |
|  | 17 | Activity networks, topological sort and critical paths, enumerating all paths | vi, vii |  | Group Discussion.  Q/A |
|  | 18 | Files: File, queries and sequential organizations | vii |  | Group Discussion.  Question Answer. |
|  | 19 | Indexing Techniques: Cylinder-surface indexing | vii |  | Group Discussion.  Q/A  Quiz 3 |
|  | 20 | Hashed indexes  B-trees; Tree indexing | vii |  | Group Discussion.  Question Answer. |
|  | 21 | Heap sort, 2-way merge sort, sorting on several keys. | iv, v |  | Group Discussion.  Q/A |
|  | 22 | Insertion Sort & Quick Sort Analysis | v, vii |  | Group Discussion.  Question Answer. |
|  | 23 | Selection Sort & Bubble Sort Analysis | v, vii |  | Group Discussion.  Q/A |
|  | 24 | Individual Presentation | ix |  | Feedback |
|  | 25 | Individual Presentation | ix |  | Feedback |
|  | 26 | Final Exam | viii |  |  |
| 26 | **Assessment Methods** | |  |  | | --- | --- | | **Assessment Types** | **Marks** | | Attendance and Participation (Class Room & Course Page) | 5% | | Assignment | 5% | | Presentation | 5% | | 3 Quizzes/ Class Tests | 15% | | Mid Term | 30% | | Final Exam | 40% | | **Total** | **100%** | | | | |
| 27 | **Grading Policy** | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Letter Grade** | **Marks %** | **Grade Point** | **Letter Grade** | **Marks%** | **Grade Point** | | A+ (Plus) | 80-100 | 4.00 | C+ (Plus) | 50-54 | 2.50 | | A (Plain) | 75-79 | 3.75 | C (Plain) | 45-49 | 2.25 | | A- (Minus) | 70-74 | 3.50 | D (Plain) | 40-44 | 2.00 | | B+ (Plus) | 65-69 | 3.25 | F (Fail) | <40 | 0.00 | | B (Plain) | 60-64 | 3.00 | I\* | - | Incomplete | | B- (Minus) | 55-59 | 2.75 | W\* | - | Withdrawal | | | | |

|  |  |  |
| --- | --- | --- |
| 28 | **Additional Course**  **Policies** | 1. 1. Reports:  Report on previous Experiment must be submitted before the beginning of new experiment. A bonus may be obtained if a student submits a neat, clean and complete lab report.  2. 2. Examination:  There will be a mid-term exam and final exam both of which will be closed book.  3. 3. Unfair means policy:  In case of copying/plagiarism in any of the assessments, the students involved will receive zero marks. Zero Tolerance will be shown in this regard. In case of severe offences, actions will be taken as per university rule.  4. 4. Counseling:  Students are expected to follow the counseling hours posted. In case of emergency/unavoidable situations, students can e-mail me to make an appointment. Students are regularly advised to check the eLMS course page for updates/materials.  5. 5. Policy for Absence in Class/Exam:  If a student is absent in the class for anything other than medical reasons, he/she will not receive attendance. If a student misses a class for genuine medical reasons, he/she must apply with the supporting documents (prescription/medical report). He/she will then have to follow the instructions given by the instructor for make-up.  In case of absence in the mid/final exam for medical grounds, the student must also get his/her application forwarded by the head of the department before a make-up exam can be taken.  It is recommended that the students inform the instructor beforehand through mail if they feel that they will miss a class/evaluation due to medical reasons. |
| 29 | **Additional Info** | 1. Academic Calendar Spring 2021: <http://www.green.edu.bd/academics/academic-calendar> 2. Academic Information and Policies: <http://www.green.edu.bd/academics/academic-rules-a-regulations> 3. Grading and Performance Evaluation: <http://www.green.edu.bd/academics/academic-rules-a-regulations> 4. Proctorial Rules: <http://www.green.edu.bd/administrator/proctors-office> |