***LAB BASICS***

Course Title**: DATA STRUCTURES AND ALGORITHM LAB**

Course Code**: CSL-221**

Credit Hours**: 3+1**

Prerequisite**: CSL-210**

Course**:** **BSE-3**

Section**:** **B**

Instructor**:** **Engr.AYESHA KHAN**

Email**:** ayeshakhan.bukc@bahria.edu.pk

**Course Objectives & Description:**

This course introduces the formal concepts of data structures, algorithms, and their interrelationships. This course also develops skills in the design of algorithms and data types and introduces abstract methods for analyzing and comparing data structures-and algorithms. At the end of this course students will be familiar with a range of important data structures and algorithms to develop computing solutions to various problems. Contents include Introduction to Data Structures, Introduction to Algorithms, Arrays, Searching Techniques, Sorting Techniques, Stacks, Recursion, Queues, Linked List, Trees, and Graphs.

**Course Learning Outcomes (CLOs):**

Upon completion of this course, students will be able to:

|  |  |  |
| --- | --- | --- |
| **CLO #** | **CLO Statements** | **Bloom’s Taxonomy Code** |
| CLO 1 | Give an explanation complying the concepts of data structures and algorithm | A2 |
| CLO 2 | Show the professional commitment towards submission of lab files and project reports. | A5 |
| CLO 3 | Construct the advance algorithms using Arrays, Searching Techniques, Sorting Techniques, Stacks, Recursion, Queues, Linked List, Trees, and Graphs. | P4 |
| CLO 4 | Adapt the skills to perform the task related to data structures concepts and algorithms. | P6 |
| CLO 5 | Under specific requirements ability to originate and demonstrate solutions for data structure problems. | P7 |

**Weekly Breakdown:**

|  |  |  |  |
| --- | --- | --- | --- |
| Week# | Weekly Breakup Dates | Lab  Number | Tentative Course Plan |
| 1 |  | LAB 01 | 1D & 2D Arrays |
| 2 |  | LAB 02 | Linear Search ,Bubble, Selection and Insertion Sorting Algorithms |
| 3 |  | LAB 03 | Recursion |
| 4 |  | LAB 04 | Binary Search & Merge Sort |
| 5 |  | LAB 05 | Quick Sort |
| 6 |  | LAB 06 | Stacks |
| 7 |  | LAB 07 | Queues |
| 8 |  | LAB 08 | Linked List |
| 9 |  | THEORY MID TERM EXAMINATION | |
| 10 |  | LAB MID EXAM (OPEN ENDED) | |
| 11 |  | LAB 09 | Doubly and Circular Linked List + Assignment no. 1 |
| 12 |  | LAB 10 | Static Tree and Binary Search Tree |
| 13 |  | LAB 11 | Dynamic AVL Tree, B-Tree |
| 14 |  | LAB 12 | Heap, Bucket and Radix Sort |
| 15 |  | LAB 13 | Graphs |
| 16 |  | LAB 14 | Hashing |
| 17 |  | LAB MID EXAM (OPEN ENDED) + Lab File Submission | |
| 18 |  | FINAL TERM EXAMINATIONS | |

***NOTE:***

1. *This schedule is subject to revisions as conditions may warrant.*
2. *Topics will be covered in sequence no matter if city observes any planned or unplanned holidays.*
3. *The information in this course outline is subject to revision as conditions may warrant.*

***LAB ASSESMENT METHOD***

**Method of Evaluation and Structure:**

A student’s grade will be based on multiple measures of performance as mentioned below:

|  |  |
| --- | --- |
| **LAB EVALUATION** | |
| **Evaluation Instruments (EI)** | **Marks** |
| **LAB JOURNAL** | **30** |
| * **LAB PERFORMANCE (P4)** * **VIVA VOCE (C2)** * **LAB FILE SUBMISSION (A5)** | **14**  **07**  **09** |
| **OPEN ENDED LABS** | **30** |
| * **MID LAB EXAM (P6)** * **FINAL LAB EXAM (P6)** | **15**  **15** |
| **ASSIGNMENT** | **10** |
| * **ASSIGNMENT NO. 1 (P6)** * **ASSIGNMENT NO. 2 (P6)** | **5**  **5** |
| **PROJECT** | **30** |
| * **DEMONSTRATION (P7)** * **PROJECT VIVA (C2)** * **REPORT SUBMISSION (A5)** | **20**  **05**  **05** |
| **TOTAL:** | **100** |

***NOTE****: Any change in this scheme/format will be communicated well in time.*

**Mapping of CLOs to PLOs (Program Learning Outcomes)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PLOs | CLOs | | | | |
| CLO 1 | CLO 2 | CLO 3 | CLO 4 | CLO 5 |
| PLO:1 (Engineering Knowledge) |  |  |  |  |  |
| PLO:2 (Engineering Problem Analysis) |  |  |  |  | ✓ |
| PLO:3 (Designing and Development) |  |  |  | ✓ |  |
| PLO:4 (Investigation) |  |  |  |  |  |
| PLO:5 (Modern tool usage) |  |  | ✓ |  |  |
| PLO:6 (Engineer and Society) |  |  |  |  |  |
| PLO:7 (Environment and Sustainability) |  |  |  |  |  |
| PLO:8 (Professionalism and Ethics) |  |  |  |  |  |
| PLO:9 (Individual and Team Work) |  | ✓ |  |  |  |
| PLO:10 (Communication) | ✓ |  |  |  |  |
| PLO:11 (Project Management) |  |  |  |  |  |
| PLO:12 (Lifelong Learning) |  |  |  |  |  |

**Mapping of CLOs to Course Assessment**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EI | CLOs | | | | |
| CLO 1 | CLO 2 | CLO 3 | CLO 4 | CLO 5 |
| Lab performance |  |  | ✓ |  |  |
| Lab File |  | ✓ |  |  |  |
| Lab Viva | ✓ |  |  |  |  |
| Project Viva | ✓ |  |  |  |  |
| Project Demo |  |  |  |  | ✓ |
| Project Report |  | ✓ |  |  |  |
| Assignment # 1 |  |  |  | ✓ |  |
| Assignment # 2 |  |  |  | ✓ |  |
| Midterm Exam |  |  |  | ✓ |  |
| Final Exam |  |  |  | ✓ |  |

**Method of Instruction:**

Methods of instruction may include, but are not limited to, the following:

1. Lab lectures by the instructor
2. Project by the students (*max.* *four students in a group*)
3. Assignments

**Skills to be Developed:**

This course helps students in developing the following skills:

|  |  |  |
| --- | --- | --- |
| # | Skill | Through (Instrument) |
| 1 | Communication *(oral & written)* | Assignments, case study discussions, & presentations |
| 2 | Analytical | Case studies, research paper & examinations |
| 3 | Team Work | Group work, and group project development |
| 4 | Creative Thinking | Assignments, research paper, discussions, & examinations |
| 5 | Adaptability to Change | Case studies and examinations |
| 6 | Ethics | Lectures & assignments |
| 7 | Use of IT | Use of Internet and other electronic means |
| 8 | International Issues | Assignments, research paper, & discussions |

**Group Work and its Acceptable Rules:**

1. Whole class will be divided into groups of five members of your choice and each group will be assigned an **ALGORITHM** to work on and present it in a project form.
2. Upon completion of the project each group member will honestly evaluate the participation and contribution of other member within the same group.
3. There will be no such thing like group score. Every member of the group will be assessed individually, that is, within the same group every member may attain a **DIFFERENT SCORE** based on his/her work.

**Academic Honesty:**

1. Each student in the class is expected to develop his/her assignment alone. **COLLUSION** occurs where a student knowingly submits as entirely his/her own work done in collaboration with another person; or collaborates with another student in the completion of work which (s)he knows is intended to be submitted as that other student's own unaided work; or knowingly permits another student to copy all or part of his or her own work and to submit it as that student's own unaided work.
2. Do not share assignment, or assignment parts, with your classmates.
3. No to **plagiarism**. Do not copy & paste online material, consult study materials from reliable sources and reproduce them in your own words. **PLAGIARISM** is the deliberate and unacknowledged insertion into a student's work of material taken from the work, published or unpublished, of another.
4. Assignments are thoroughly checked for similarities upon the submission.
5. Violators of this policy will be held responsible for academic dishonesty, and will bear consequences in accordance to the rules and regulations of Bahria University.

**Submitting Your Assignment**

In order to be graded, you must adhere to the following:

1. All assignments must be **HAND WRITTEN or typed** depending on the type of assignment.
2. Only use assignment **template** provided to you for your assignments.
3. Use only **BLUE** ink pen/pointer for hand written assignments. This is to discourage submission of powder photo copy of someone else’s work.
4. Noncompliance will result in a score of zero marks.

**Late and Missed Submissions**

1. Late assignments will not be accepted for any reason whatsoever.
2. In case, you fail to show up, submit your assignment through an Email.
3. Send **SCANNED** version of **HAND WRITTEN** assignments through Emails.
4. Submission through an Email is only for those who are physically unable to attend the University on that particular day.
5. Either you submit personally or through an Email the submission deadline will remain the same, i.e., no assignment will be accepted after class timings (assignments must be in my inbox up to 4:30PM).
6. You are advised to keep a copy of your submission in your own Email account (with the original time-stamp).
7. For all electronic submission, use **DECENT** Email IDs in format like **your\_name\_reg.no@whatever.com**. For example, **majid\_1234@yahoo.com**. In the Email subject, type your semester and assignment title like **“BSE-7\_Moral\_Theories”**. No Email will be entertained/checked violating this format or having fancy Email IDs *(like cool\_guy/cool\_princess etc.)* and such assignments will not be graded.

**Academic Integrity**

1. Students are expected to promote honesty, trust, fairness, respect and responsibility.
2. In case of any dispute over scores or grades student may file a formal appeal to the head of the concerned department or examination department as per Bahria University reassessment/rechecking/scrutiny policy.

**Attendance Policy**

1. Punctuality and regularity shows your commitment and dedication.
2. Attendance is online, once entered into the system, cannot be changed later on even by the course teacher.
3. Please consult **STUDENT HANDBOOK** for allowed number of absences.

**Grading System:**

|  |  |  |  |
| --- | --- | --- | --- |
| Letter Grade *(& meaning)* | | Percentage | Grade Point |
| A | Outstanding | 87 – 100 | 4.0 |
| B+ | Very Good | 80 – 86 | 3.5 |
| B | Above Average | 72 – 79 | 3.0 |
| C+ | Satisfactory | 66 – 71 | 2.5 |
| C | Barely Acceptable | 60 – 65 | 2.0 |
| D | Poor | 50 – 59 | 1.5 |
| F | Fail | Below 50 | 0.0 |
| W | Withdrawal |  |  |
| I | Incomplete Coursework |  |  |

***NOTE*:** *The minimum consequence for submitting a plagiarized (copied) or falsified assignment, test, report, project, or any evaluated material will award zero marks on that material.*

**Counseling Hours:**

1. Students are encouraged to approach subject teacher beyond class hours to discuss academic or subject related problems.
2. Arrange and confirm an appointment through email at: [misbahperveen.bukc@bahria.edu.pk](mailto:misbahperveen.bukc@bahria.edu.pk) for an available time slot.
3. Ensure your presence in your allocated time slot.

**Students with Special Physical or Educational Needs/Challenges:**

1. Students with special physical and/or academic needs/challenges are entitled for extra attention and time beyond class timings.
2. Such students are advised to inform this situation to their subject teacher (that’s me in this course and other faculty members in other courses) at/before the beginning of the course either through an Email or personally for additional & convenient time slots beyond class hours.
3. Special arrangement may also be made available after receiving requests based on specific needs/challenges.

***NOTE*:** *The information in this course outline/lesson plan is subject to revision as conditions may warrant.*

***COURSE RESOURCES***

**Instructor:**

**Name: Engr. DR FARAH DEEBA**

**Designation: Sr. Assistant Professor**

**Office:**

**email:** farahdeebauestc@hotmail.com

**Lab Instructor:**

**Name: Engr. Saniya Sarim**

**Designation: Lab Engineer**

**Office: Faculty Room 7, 2nd floor, Iqbal block**

**email:** [saniyasarim.bukc@bahria.edu.pk](mailto:saniyasarim.bukc@bahria.edu.pk)

**Lab hours (BSE 3B):FRIDAY (2:30-5:30 pm)**

***Text Book***

* + 1. avidson, J. K. a. K., 2004. *Data Structures Demystified.* s.l.:McGraw-Hill/Osborne.

***Reference Books***

1. Naimipour, R. N. a. K., n.d. *Foundations of Algorithms Using C++ Pseudocode.* Third ed. s.l.:JONES AND BARTLETT PUBLISHERS.
2. Wayne, R. S. &. K., n.d. *Algorithms.* Fourth ed. s.l.:Pearson.
3. Weiss, M. A., n.d. *Data Structures and Algorithms Analysis in C++.* Fourth ed. s.l.:s.n.

***Online Resources***

1. Point, T., n.d. *Toturials Point Data Structures and Algorithms.* [Online]

Available at: http://www.tutorialspoint.com/data\_structures\_algorithms/index.htm