Electrical and Electronics Engineering Institute

EEE 121: Data Structures and Algorithms for Electrical and Electronics Engineering
Second Semester A.Y. 2019-2020

Course Description: Tools and methodologies for modeling and solving different programming problems across multiple programming paradigms. Introduction to organizing and modeling various kinds of data with emphasis on the relationship of algorithms and programming.

Prerequisite: EEE 111: Introduction to Programming and Computation or EEE 11: Programming Fundamentals

Instructors:

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Course Outline

Meetings	*Topic*
3	**Preliminaries and Introduction to C++ Programming** Class Policies, Python vs. C++, G++ Compiler Model, Introduction to Object-Oriented Programming, C++ Classes, C++ Libraries
3	**Other C++ Programming Details** Pointers, Lvalues, Rvalues and References, Parameter Passing, Return Passing, Memory Allocation, Copy Constructors, Copy Assignment, Operator Overloading, Templates
4	**Introduction to Algorithm Analysis** Algorithm Correctness, Proof by Induction, Proof by Contradiction, Finding Loop Invariants, Time Complexity, Space Complexity, Big O Notation, O(N^2) Sorting Algorithms
6	**Some Problem Solving Paradigms** Recursion, Correctness of Recursive Algorithms, Introduction to Programming Paradigms, Divide and Conquer Algorithms, Recursive Backtracking, Memoization, Iterative Complete Search, Recursive Complete Search
4	**Introduction to Linear and Non-linear Data Structures** N-Dimensional Arrays, Lists, Stacks, Queues, Dequeues, Hashes, Linear Search, Binary Search, Trees, Heaps, Sets, Maps, Priority Queues
Long Exam 1 (March 23, 2020 4PM-6PM)	
4	**Classical Dynamic Programming** Dynamic Programming as Optimization, Decision Trees, Tabular Approach, Select Dynamic Programming Problems
3	**Disjoint Sets and Graphs** Union-Find Data Structure, Graph Representations, Depth-First Search (DFS), Breadth-First Search (BFS), Topological Sort
3	**Graph Algorithms: Shortest Paths, Minimum Spanning Trees** Bellman-Ford Algorithm, Djikstra's Algorithm, Prim's Algorithm, Kruskal's Algorithm
Long Exam 2 (May 11, 2020 4PM-6PM)	

References

1. R. Sedgewick and K. Wayne, **Algorithms**, 4th edition, Addison-Wesley Professional, 2011.
2. S. Dasgupta, C. H. Papadimitriou, and U. Vazirani, **Algorithms**, 1st edition, McGraw-Hill, Inc., 2006.
3. **CS 161 Design and Analysis of Algorithms**, Stanford University, Fall 2017. [Online]. Available: https://web.stanford.edu/
4. J. Hug, **CS 61B Data Structures**, University of California, Berkeley, Spring 2018. [Online]. Available: http://datastructur.es/
5. S.B. Lippman, J. Lajoie, and B.E. Moo, **C++ Primer**, 5th edition, Addison-Wesley Professional, 2012.
6. E. Demaine, and S. Devadas, **Introduction to Algorithms**, MIT OpenCourseware. [Online]. Available: https://ocw.mit.edu/

7. T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, **Introduction to Algorithms**, 3rd edition, The MIT Press, 2009.

8. B. Stroustrup, **Programming: Principles and Practice Using C++**, 2nd edition, Addison-Wesley Professional, 2014.

9. S.S. Skiena, **The Algorithm Design Manual**, 2nd edition, Springer Publishing Company, Inc., 2008.

Grading System and Policies

Class Exercises (Machine Exercises, Quizzes, etc.)	35%
Machine Problems	25%
Problem Sets	10%
Long Exams	30%
TOTAL	**100%**

Grading Scale

[92,100]	1.00	[72,75]	2.25
[88,91]	1.25	[68,71]	2.50
[84,87]	1.50	[64,67]	2.75
[80,83]	1.75	[60,63]	3.00
[76,79]	2.00	[0,59]	5.00

General Class Policies

1. Students are required to read and abide by the U.P. Diliman Acceptable Use Policy (AUP) at . The AUP governs the usage of IT infrastructure in the University. By using the PCs in the lab and/or connecting to the UP Diliman WiFi network, you are automatically bound by the AUP.

2. Students using the network for purposes outside of class (eg FaceBook, Twitter, Games, etc) will be given a warning (first offense), asked to leave the room (second offense) and will be force dropped from the class (third offense).

3. Students' laboratory fees only cover USE of laboratory equipment and components. A student shall be held liable for equipment or component damage if due to abuse, misuse, negligence, or disregard of basic electronics know how. Ignorance of proper equipment handling shall not be accepted as an excuse.

4. Students are expected to conduct themselves in a professional and courteous manner when inside the laboratory.

5. Food and drinks are NOT allowed inside the laboratory.

6. Cleanliness and orderliness of the laboratory should always be maintained.

7. Students are expected to clean up their work areas after the class and throw waste materials in the trash bins provided.

8. Laboratory Exercises are INDIVIDUAL WORK. They will be allowed to be submitted/checked by the owner on the designated time ONLY. Late exercises will be given a grade of 0.

9. Discussion of ideas are encouraged. However, sharing of work (e.g. source code, papers for submission, etc.) is considered cheating

10. Students who are caught cheating (whether as source or sink) or are proven guilty of cheating will be reported to the student disciplinary council and will be given a final grade of 5.

11. Students who fail to attend laboratory classes due to valid reasons will be requested an excuse letter (Medical certificates must be signed by the University Health Service) for them to have their Laboratory Exercise checked by the instructor.

Violation of the aforementioned rules shall be met with punishments ranging from, but not limited to grade deductions, a failing grade, suspension or expulsion from the university or a combination thereof. Replacement of damaged equipment and other properties shall also be demanded of the violator.

Announcements are through the Google Classroom. **(Class code: 5mawknp)**

To ask for a consultation, email the instructor first and wait for his confirmation.