SWE 2015 – 42 DATA STRUCTURES

PROF. NAVRATI SAXENA

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About the course

Course Name: Data Structures

Instructor: Prof. Navrati Saxena

Course Code: SWE-2015-42

Course Day/Time: Wednesday: 09:00-10.15; 10:30 – 11.45

Course Mode: Online (videos)

Office Hours: Email me if you would like to meet me to discuss anything related to the course. I will provide a WebEx/Zoom link for our meeting.

Course Outline

Course Outline: The course is about data structures. In this course we will learn about the representation and manipulation of data. All programs represents data in some way. Computer Science is about programming. All programs manipulate data through algorithms. The study of data structures and algorithms is fundamental to Computer Science. In this course we will learn about the design and analysis of data structures; various types of data structures; their advantages and disadvantages over each other and their applications.

Book: Data Structures Using C and C++ by Yedidyah Langsam, Moshe J Augenstein, Aaron M Tenenbaum. 1995, Pearson. ISBN-13: 9780130369970

Grading Policy

#	Test Types	Weightage
1	First Quiz	10%
2	Mid-Term	40%
3	Second Quiz	10%
4	End-Term	40%

Classroom Etiquette

- Take responsibility for your education
- Attend every class
- Respect your instructor and yourself
- Come to class prepared
- Turn in your work on time
- When having academic difficulty seek assistance
- Email for one-to-one meeting
- Email for doubts
- Email for re-grading

Pre-requisite

- **Must know any programming language, preferably C**
- **Must know basic mathematics and common mathematical functions**

Schedule - SKKU

- Introduction
- Data Structures Concepts
- Pointers & Structures Basics in C
- Estimating algorithm complexity
- Linear ADTs
  - Stack
    - Stack implementation –where are stacks used?
  - Queue
    - Circular
    - Priority
- General Lists
    - Arrays – contiguous allocation
    - Linked list / linked allocation
    - Circular list
    - Doubly linked list
- Binary Trees
- Binary Search Trees
- Graph Data Structure
- Minimum Spanning Trees
- Searching and Sorting
- Heaps and Heap Sort

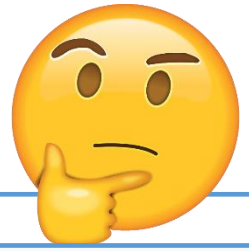
Week-wise Schedule

1 Feb. 23 Introduction Data St. Concepts	2 March 2 Programming Basics	3 March 9 Estimating Complexity	4 March 16 Stack Queue
5 March 23 QUIZ – I	6 March 30 Array *Ungraded Assignment*	7 April 06 Review	8 April 13 MID TERM
9 April 20 Linked List Trees – I	10 April 27 Trees – II Binary Search Tree	11 May 04 Graphs I & II	12 May 11 QUIZ - II
13 May 18 *Discuss Assignment, Quiz-1, MidTerm, Quiz 2* Graphs III Prim's Algo Hash Table/Hashing – I	14 May 25 Hash Table/Hashing – II Heaps & Heap Sort	15 June 01 END TERM	

Motivation – Why this course?

Computer engineering is about solving problems by writing programming

- ❖ Not just any solution, but the best possible solution for the given problem
- ❖ What is the best solution?



- Efficient - performance & speed
- Cost effective
- Scalable
- Useful

- Correct
- Robust
- Secure
- Modifiable

Improving Computation

DATA STRUCTURE

- Choosing suitable data organization
- Having efficient data sorting and retrieving mechanism

DESIGN OF ALGORITHMS

Applying appropriate strategies for problem solving

- Greedy, dynamic programming, divide and conquer, branch and bound, etc.

SOLUTION CHARACTERISTICS

- Efficient (Performance and Speed)
- Cost effective
- Scalable

SWE 2015 – DATA STRUCTURES

Efficient organization of:
Complex data, operations to be performed on them, their algorithms

Efficient problem solving approach

Course Objectives

- Learn Definitions and type of Data Structures
- Learn operations using Data Structures
- Learn basics of analyzing order complexity of algorithms

What The Class Is About

- **Data Structures**
  - Representation and manipulation of data
- All programs represents data in some or the other way
- All programs manipulate some data by using algorithms
- Study of data structures and algorithms is fundamental to Computer Science.

Thank you!