

Data Structures

3 credits theory B.Tech./CS

Instructor: Prof.K.V.Iyer
CSE-102 – Ground floor
Dept. of Computer Science & Engg.

Pre-requisites:

Knowledge of computer programming in C or Java and Computer Organization is required.

Course overview:

A fast-paced review of programming language concepts and algorithm analysis will be given first – this will include parameter passing methods, recursion, operation counts, asymptotic notations. The course will begin with basic ideas of data structures and understanding their usage via a sequence of graded examples. Use of arrays and matrices, stacks and queues and priority queues via imperative programming language style will be illustrated, focussing on implementations. This will be followed by manipulations of linked lists and their variants (circular linked lists, doubly linked lists) and an introduction to dynamic memory management. Trees and heaps and their uses will be detailed subsequently. Examples in sorting and other domains will be given as the course progresses. Hash tables, binary search trees and RB-trees will be covered next. An introduction to data structures using disjoint sets will follow next. Basic graph manipulation techniques and example graph algorithms will be covered. The lectures will emphasize algorithmic manipulations in the use of data structures and useful mathematical analyses in the design of efficient algorithms and codes. Programming assignments will be a part of the course.

Course objectives and expected outcomes:

The objective is to introduce basics of data structures with algorithms for Computer Science students. This will help the students to write efficient codes for a variety of standard problems such as sorting, linked list manipulation etc. Another objective is to provide an insight into a few advanced level topics that are considered essential in the design of efficient algorithms as well as in writing programs.

The expected outcome is that 45% of the students will be immediately industry-ready with respect to this course; the next 45% of the students will find the course interesting enough to be motivated and do technical work related to this subject and will be ready to do allied courses. About 50% of the students will be able to probe more into more advanced applications in Computer Science in other areas such as web technology, database systems, further topics in algorithms.

Teaching-learning activities:

- There will be three to four classes per week. Lectures will be delivered with pointers to references and handouts. The announced schedule will be followed.
- The data structures laboratory work should provide more practice in coding and testing programs apart from assignments problems.
- Assignments should be done individually with/without help. Some of the assignment questions will figure, often disguised, in the tests too.

Tests and assignments:

Two quizzes (best one out of the two) for 45 minutes - for 15 marks

One mid-term test – for 25 marks

Two assignments - for 20 marks

End of semester test - 40 marks

Schedule: Time and venue will be announced in class/notice board

Assignments: I - 27 July II - 5 Sept.

Quiz: I - 5 Aug. II - 5 Sept.

Mid-term test: 4 Oct.

Final test: 16 Nov. 2016

Course feedback from students:

Course feedback will be taken as per instructions by higher authorities.

Course policy - Academic honesty, attendance, copying:

Academic integrity will be enforced strictly. Copying in assignments will also be punished.

K.V.Iyer
Instructor