

Module 133.0.1.2 :: Prerequisites :: Data Structures

Data Structures

You should have a thorough understanding of Implementation of linear lists including stacks and queues, and binary trees. Really though, this is not quite enough, you should be quite comfortable with most of the material covered in CSC-130. The list below represents some of the topics that we may make use of in this course. This topic is far too extensive, however, to cover thoroughly in a short prerequisite module.

I've observed that programmers at this level often overuse arrays when other data structures would be more appropriate. In this course the quality of your code, including choosing an appropriate data structure, will have an impact on your grade.

Expected understanding of this material:

- Representation of data structures (contiguous/sequential, linked).
- Data abstraction and procedural abstraction.
- Tools and techniques to allow generic data types, e.g. templates.
- Dynamic memory allocation and use of pointers.
- Recursion as a problem solving technique, and its implementation in programming languages.
- Application of stack, queue, linear list ADTs.
- Representation of trees, including cursor representation.
- Standard algorithms to manipulate trees, including binary search trees, AVL trees, heaps and Btrees.
- Representation of graphs.
- Standard algorithms to manipulate graphs, including breadth and depth first search, spanning trees, shortest path.
- Representation of sets: union-find, hashing.
- Evaluation of various alternatives to select appropriate data structures.
- Basic understanding of exception handling.

Reading Material

1. Review your materials for CSC-130

Video Lecture

Carrie Anne Philbin of Cambridge produced this excellent "crash course" video for PBS. This by no means covers everything that you should know about data structures; however, you should be able to watch this at full speed and immediately understand what's going on. If not, spend some time reviewing your CSC-130 materials. I will assume that you understand how to implement arrays, structures, nodes of lists, lists, and trees in Java.