May

Using this document

The document specifies topics with section references to the course text book - "Algorithm Design Manual" by Steven Skiena. The practice problem set will contain problems based on the topics specified. For each of the topics, there are ample problems to try on CodeChef, CodeForces and other websites. For effectiveness, use the problem-tag feature to practice particular topics. Going through all the resources **is not necessary but recommended.**

From The Algorithm Design Manual by Steven Skienna

3 Data Structures
3.1 Contiguous vs. Linked Data Structures
3.2 Stacks and Queues
3.3 Dictionaries
3.4 Binary Search Trees
3.5 Priority Queues

4 Sorting and Searching
4.1 Applications of Sorting
4.2 Pragmatics of Sorting
4.3, 4.5, 4.6 - Sorting - Mergesort, Quicksort, Heapsort
4.9 Binary Search and Related Algorithms

Other

Binary Search

https://www.topcoder.com/community/data-science/data-science-tutorials/binary-search/
(incredible tutorial, you won't need to read any other)

Problems
March challenge - Cooking Schedule
CF round 403 - Meeting Place
SPOJ - Aggressive Cows
FCP - Ballot

Tries

https://www.topcoder.com/community/data-science/data-science-tutorials/using-tries/
https://threads-iiith.quora.com/Tutorial-on-Trie-and-example-problems
https://sites.google.com/site/indy256/algo/trie - Trie implementation in Java

Essential Inbuilt Data Structures - C++

C++ is the preferred language for many competitive programmers because it's fast and comes with a very nice inbuilt DS&Algorithms library called the STL.
https://www.topcoder.com/community/data-science/data-science-tutorials/power-up-c-with-the-standard-template-library-part-1/
https://www.hackerearth.com/practice/notes/standard-template-library/

Essential Inbuilt Data Structures - Java

https://docs.oracle.com/javase/tutorial/
Java Collections Framework : Queue, HashMap, Set, Stack, ArrayList, Vector. Many more are there, but remembering the names is difficult. You should learn how to use at least the above listed.
Java comes with the BigInteger class, to handle operations on numbers which do not fit in a (64 bit) long data type.

Essential Inbuilt Data Structures - Python

Python is slow, but this is usually not a problem because there is usually a 5x multiplier on the time limit.
e.g. a time limit of 1 second will be relaxed to 5 seconds for Python programs.
Biggest perk of coding in Python is the small syntax.
Second biggest perk is that Python handles really large numbers (>10^18) automatically.
DS: dictionaries, lists, sets. No special data structures in python are normally required.

At a Glance: May Challenge

As we have recently concluded with the May challenge and the editorials for the problems are out, you will get exposed to many data structures and techniques you probably didn't hear before or couldn't understand. The optional part of the reading exercise is to explore this advanced stuff which may help in future:
Some Topics:
Note: These topics are **not part of the** reading material and you are not expected to understand them fully. They are just in case you are done with the above topics and have some time left.

1. Greedy Algorithms
2. Segment Tree
3. Deque
4. Meet-in-the-middle