

CS302 in Support of Student Outcomes

CS302: Fundamental Algorithms is a third-semester programming course in C++ which focuses on fundamental algorithms of computer science.

This course contributes significantly to the following Student Outcomes:

- (a) an ability to apply knowledge of computing and mathematics appropriate to the discipline.
- (c) an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- (i) an ability to use current techniques, skills, and tools necessary for computing practice.

The following are the Course Outcomes for CS302, and the student outcomes to which they map.

1. Understanding of algorithms (a): For each algorithm listed below, students are expected to understand how the algorithms work, what problem they solve, when to apply them and what their running time is.
 - Priority queues as implemented by binary heaps.
 - Sorting algorithms: Insertion sort, heap sort, quicksort, merge sort, bucket sort
 - Basic graph algorithms: Topological sort, depth-first search, breadth-first search
 - Shortest path determination by Dijkstra's algorithm
 - Minimum spanning tree determination by Prim and Kruskal's algorithms
 - Network flow / minimum cut with augmenting paths
 - Disjoint sets
 - Dynamic programming with memoization
2. Application of algorithms (c): For the algorithms listed above, students are expected to be able to employ them while designing and implementing solutions to problems. The implementations will take the form of programs and class implementations in C++ that solve specified problems.
3. Use of current tools (i): Students should be able to program in a Unix environment, effectively employing the C++ programming language and the Standard Template library. The students should leverage standard tools for configuration management, version control and debugging where appropriate.