1. Review of Dynamically Allocated Multi-dimensional Arrays

2. Asymptotic complexity measures: big $\mathcal{O}$, little $o$, big $\Theta$, big $\Omega$.

3. Review of Linear Data Structures
   
   (a) Linked lists, variants, doubly linked lists
   (b) Stacks: array-based implementation vs linked implementation
   (c) Queues: circular array implementation vs linked implementation
   (d) Operations on linear data structures: search, insert, delete, list traversal

4. Review of Recursion

5. Trees and Recursive Data Structures
   
   (a) Binary search trees
   (b) depth-first and breadth-first search, insert, delete, and traversals
   (c) Height balanced (AVL) trees
   (d) Heaps
   (e) B-Trees
   (f) Application: Parse trees
   (g) Application: Huffman codes

6. Hash tables
   
   (a) Modular arithmetic and simple hash functions
   (b) Chaining
   (c) Open addressing: clustering, linear probing, pseudo-random probing, quadratic probing, and double hashing
   (d) polynomial hash functions
   (e) Operations on hash tables: search, insert, delete
7. Sets:
   (a) bit vectors, efficient implementation (bit packing)
   (b) membership union, intersection, and set-difference

8. Graphs
   (a) Adjacency matrix representation
   (b) Adjacency list representation
   (c) Some basic graph algorithms: depth-first search, pre- and post-numbering, topological sort, minimal spanning tree

9. Introduction to the Analysis of Algorithms

10. Binary search

11. Efficient sorting methods
   (a) Mergesort
   (b) Quicksort
   (c) Heapsort

12. Finding $k^{th}$ largest element of an ordered list, and its relation to quicksort.

13. Proficiency in using Unix, the Unix development environment(s), integrated development environments, and Java.

Expectations:

- Class participation; communicate if things get complicated.
- Use of good coding practices and some basic coding standards in programming projects.
- Your best effort.

Excused Absences:

- Missing an exam is only excused for a limited number of reasons and circumstances must be verifiable. Acceptable circumstances include only:
  - Excused absences approved by the dean, e.g., varsity sports, dance team, marching band, etc.
  - A medical reason.
  - Childbirth (by you or your spouse/partner).
  - Military duty.
  - The passing of a family member.
- The final exam date is Monday May, 1, 2017 at 9:00am. Early exam times are not available to accommodate travel plans.
Grading:
Three exams (65%), programming assignments and take home problem sets (35%). Programming assignment(s) must be submitted ready to compile and run under Linux.

Disability Notice:
If you have a disability that may require an accommodation for taking this course, then please contact the Learning Assistance Center (758-5929) within the first two weeks of the semester.

Pandemic Planning Notice:
The University has requested that faculty collect personal contact information as part of emergency planning and preparation. The information you provide is strictly confidential.