1 Website

`https://www.swamiiyer.net/cs210/`

2 Course Description

The design and implementation of computer programs in a high-level language, with emphasis on proper design principles and advanced programming concepts, including dynamic data structures and recursion. Efficient design, implementation and debugging techniques are stressed. The assignments are designed to introduce the student to a variety of topics in computing: data structures and ADTs, Lists, Stacks, Queues, Ordered Lists, Binary Trees, and searching and sorting techniques.

Prerequisites: CS110 and Math 130; or permission of the instructor.

This course meets program outcomes 1d (be proficient in at least one in-demand programming language) and 2a (understand and work with some of the important theoretical underpinnings to computer science). Students who successfully complete this course will be able to confidently implement, debug, and put a wide variety of algorithms and data structures to work in computational problems that they might encounter later in their careers. The course covers fundamental material that will be of value to students interested in science, mathematics, and engineering.

3 Text

Algorithms by Robert Sedgewick and Kevin Wayne

The text provides an excellent survey of the most important algorithms and data structures in use today, motivating each algorithm by examining its impact on applications to science, engineering, and industry.

4 Topics Covered

- Course Mechanics
- Programming Environment
- Fundamentals
  - Programming Model
  - Data Abstraction
  - Analysis of Algorithms
  - Basic Data Structures
  - Union-find
- Sorting
  - Elementary Sorts
  - Merge Sort
  - Quick Sort
  - Priority Queues
  - Applications
- Searching

  - Symbol Tables
  - Binary Search Trees
  - Balanced Search Trees
  - Hash Tables
  - Applications
- Graphs
  - Undirected Graphs
  - Directed Graphs
  - Minimum Spanning Trees
  - Shortest Paths

5 Grading

Students' final grades are determined as follows:

Assessment	% of Final Grade
Projects (best 5 out of 6)	25
Exams (1 and 2)†	70
Participation	5

† If you score at least 80% on both exams, the higher of the two scores will be considered as your exam average.

The projects:

#	Project
1	Percolation
2	Deques and Randomized Queues
3	Autocomplete
4	8 Puzzle
5	KdTrees
6	WordNet

6 Academic Honesty

Cheating on the projects or exams constitutes a violation of the academic honesty code, and will be handled according to the procedures delineated in the Student Code of Conduct, Appendix B.

7 Accomodations for Students with Disabilities

Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services. The student must present these recommendations and discuss them with the instructor within a reasonable period, preferably by the end of Add/Drop period.