**EE 367L Computer Data Structures and Algorithms Lab**

**Credits:** 1

**Categorization of credits:** Engineering topic

**Instructor’s or course coordinator:** Galen Sasaki, Jan. 9, 2021.

**Text Book and Other Required Materials:** There are lab notes, but no required textbook. There is a reference book, which is the required textbook for EE 367: Cormen, Leiserson, Rivest, and Stein, “Introduction to Algorithms”, third edition, The MIT Press.

**Designation:** Required for Computer Engineering, Elective for Electrical Engineering

**Catalog Description:** **EE 367L Computer Data Structures and Algorithms Lab (1)** (1 3-hr Lab) Laboratory for 367. Pre: 367 (or concurrent).

**Pre- and Co-requisites:** EE 367 or concurrent

**Class/Lab Schedule:** One 3-hr lab session per week.

**Topics Covered:**

* Applying data structures and algorithms in designing and developing software
* Software development tools and techniques such as debugging tools (e.g., gdb) and source control tools (e.g., GIT)
* Experience working on complex software development projects that will take significant periods of time, e.g., 4 to 8 weeks.
  + Example: Developing a program that will simulate a simplified Ethernet network on a mesh topology including multiple processes (one per network node). This is an eight week project.
* The next two items are not directly related to data structures but supports the Computer Engineering Undergraduate Program Outcomes and Program Educational Objectives:
  + Research and write a report on lifelong learning activities
  + Research and write a report on contemporary issues and the impact of engineering solutions in a global, economical, environmental, and societal context
* A research and write a report on a current topic related to data structures and algorithms

Lab assignments (subject to change)

* Introduction – Review of UNIX, tutorial on gdb
* Simple file server and client. This applies simple data structures
* Written research report on lifelong learning.
* Introduction to source control git
* Written research report contemporary issues and engineering impacts
* Simulator for simple switched local area network (LAN) for tree topologies – part 1. This applies simple data structures, and some knowledge of graph theory (e.g., trees).
* Written research report on a current topic in data structures and algorithms, e.g., big data or data centers. This applies moderate to complex data structures and algorithms.
* Simulator for simple switched LAN for meshed topologies – part 2. This applies simple data structures, and knowledge of graph theory (e.g., shortest paths).

**Course Objectives and Relationship to Program Objectives:**

The objective of this EE367L lab course is to provide practical opportunities for students to

* Apply data structures in designing and developing software
* Use software development tools and techniques such as debugging tools (e.g., gdb) and source control tools (e.g., GIT)
* Work on complex software development projects that will take significant periods of time, e.g., 4 to 8 weeks.
* Work in teams
* The next two items are not directly related to data structures but supports the Computer Engineering Undergraduate Program Outcomes and Program Educational Objectives
  + Research lifelong learning activities
  + Research on contemporary issues
  + Research on the impact of engineering solutions in a global, economical, environmental, and societal context

Program Objectives this course addresses: 1, 2, 3, 4 and 5.

**Course Outcomes and Their Relationship to Program Outcomes**

The following are the course outcomes and the subset of Program Outcomes (numbered 1-8 in square braces "[ ]") they address:

* Design and implement complex software that uses a variety of data structures, algorithms, discrete math including graph theory [1, 2, 8]
* Be able to apply software design tools [7]
* Be able to work in teams [5]
* A recognition of the need for, and an ability to engage in lifelong learning [7]
* Understand the impact of engineering solutions in a global, economic, environmental, and societal impact [4]
* A knowledge of contemporary issues [2]
* An ability to communicate effectively through written reports [3]

**Contribution of Course to Meeting the Professional Component**

Engineering topics: 100%. Technical Writing: 30%

**Computer Usage:** 100% percent of assignments use computers, software tools (git, gdb, Unix), the Internet, etc. Also, research reports require the use of the Internet, Microsoft Word, and other software to prepare reports.

**Design Credits and Features:**

EE 367L has 1 design credit. Most of the work in this laboratory course involves design. There are software projects which require design, and there are assignments that introduce design tools.