

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.