EE367  Computer Data Structure and Algorithms, and Labs (EE367L)

Designation: Required

Catalog Description:
Introduction to computer programming algorithms with emphasis on advanced data structure, input-output routines, files, and interpreters.

Credits: 3 (+1 for EE367L)

Prerequisite: EE160 (or equivalent) or permission of instructor

Class/Lab Schedule: 3 lecture hours per week (+ a 3-hour lab per week for EE367L)

Topics Covered:
This course covers the fundamental concepts of data structures and algorithms in support of more advanced computational software and application development. Throughout the course, practical data structures are developed in conjunction with useful algorithms to demonstrate not only the close relations among them but also the time and space savings resulting from their effective combinations. All assignment problems, lab work, and mini projects buttress such relations and resulting values in engineering computing and application software. The topics covered are

- Introductions and programming style/discipline (3 hrs)
- Lists, stacks, queues and applications (3 hrs)
- Recursion: principles and calling tree (2 hrs)
- Linked Lists: linked stacks and queues and applications (3 hrs)
- Searching: sequential and binary search, comparison trees, asymptotic issues (4 hrs)
- Sorting: insertion, shell, divide and conquer, merge, and quick sort (4 hrs)
- Heap: heap and heap sort, priority queue (2 hrs)
- Hashing: tables, hash function, collision resolution and analysis (3 hrs)
- Binary Trees: tree search and traversal, tree sort, binary search tree (5 hrs)
- General Trees: tries, B-trees, black-red trees, games and look-ahead (5 hrs)
- Graphs: types and representation, traversal, topological sort, shortest path (6 hrs)

Text Book and Other Required Materials:
Homepage: www.ee.hawaii.edu/~dyun/ee367 contains all relevant material and information for the course. All lecture notes, handouts and supplements, clarifications, assignments, lab task specifications, project requirements, selected solutions, reviews, sample exams, etc. are posted online as the course progresses. It is a complete and convenient one-stop link for the entire course. Only such material like exams, quizzes, solutions are not posted on this homepage. Students are encouraged to visit the course homepage often (4 to 5 times per week; but in practice, most students do that more often).

Course Objectives and Their Relationship to Program Objectives:
The student learns not only the concepts of data structures and algorithms but also the practical use of them in engineering applications and the use of computer software (which is often more
than 50% of the value for any product with an electronic component). [Program Objectives this course addresses: 1, 2, 3, 4 5 and 6.]

Course Outcomes and Their Relationship to Program Outcomes:
The following are the course outcomes and the subset of Program Outcomes (numbered 1-11 in square braces "[ ]") they address:

- The practical aspect of using computers and programming in support of engineering applications and products. [1,2,3,4,5,7,9]
- Develop the ability to formulate, model, simulate and computerize engineering and social systems [1,3,5,8,9,10,11]
- Enhance the student’s ability to design an experiment and to analyze the resulting data by computer execution of programs [1,2,3,5,7,11]

Contribution of Course to Meeting the Professional Component
Computing: 100%

Computer Usage:
This course is all about computer usage and engineering problem solving. Heavy Internet usage is also required for all aspects of this course and throughout the semester.

Design Credits and Features:
EE 367 (+L) has 3 design credits since program design to solve problems is the core skill developed throughout the course.

Instructor(s): Tep Dobry, Galen Sasaki, David Yun.

Person(s) Preparing Syllabus and Date: David Yun, June 16, 2009.