EE 2372 --- Software Design I

Summer 2020

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Texts: Programming in C (4th Edition)
by Stephen Kochan

Optional Reference Texts:
GNU/Linux Application Programming by M. Tim Jones (2nd Edition)
Linux Pocket Guide by Daniel J. Barrett (2nd Edition)

Course Description: Foundations of data structures and algorithms. These foundations include: space and time complexity analysis, the use of data structures such as linked lists and binary trees, basic sorting and searching algorithms, and foundations of software testing/verification/validation.

Prerequisite: CS 1320 with a grade of "C" or better.

Class Hours: Asynchronous online course delivered via Blackboard.

Office Hours: On demand via Cisco's WebEx.

Course Outline:

Week 1:	Introduction and quick review of C language programming constructs
Week 1:	Functions for code re-use
Week 1:	Fundamental data structures: arrays, pointers and structures
Week 2:	Fundamental data structures: strings and string processing
Week 2:	C standard library: Console and File I/O
Week 2:	Exam 1
Week 2-3:	Fundamental data structures: linked-lists
Week 3:	Fundamental data structures: binary trees
Week 3-4:	Fundamental algorithms: sorting and searching
Week 4:	Time complexity analysis of algorithms
Finals Day:	Exam 2

Grading:

Quizzes	30%
Assignments	30%
Exam 1 (June 17th)	20%
Exam 2 (July 5th)	20%

Learning Objectives: [correlation to ACM curriculum standards in square brackets, knowledge units in bold should be covered in a pre-requisite course as well]

1. Become a proficient user of the Linux software development environment and GNU software development tool-chain [***CE-SWD-2***]
    a. Linux software development environment
    b. GNU software development tools – *gcc, gdb, make, gprof, gcov*
2. Understand C language programming constructs [***CE-SWD-3***]
    a. variables
    b. algebraic and logical expressions (including operator set)
    c. simple I/O
    d. decision statements
    e. iterative control statements
3. Understand and follow structured software design strategies [***CE-SWD-3***]
    a. programming paradigms: procedural/modular, object-oriented
    b. design for reuse using the procedural/modular paradigm
    c. utilizing standard libraries, focus on C standard library
4. Understand and utilize fundamental data structures [*CE-SWD-5*]
    a. arrays and structures
    b. strings and string processing
    c. pointers, linked lists, and binary trees
    d. storage allocation: static, stack and heap
5. Understand the foundations of algorithm analysis [*CE-CAL-1*, *CE-CAL-2*, *CE-CAL-3*]
    a. history and the role of algorithms
    b. determine time complexity of algorithms
6. Understand and utilize fundamental algorithms [*CE-CAL-5*]
    a. sorting algorithms: bubble sort and insertion sort
    b. searching algorithms: linear search and binary search

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