EE 2372 --- Software Design I

Fall 2018

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Texts: Programming in C (4th Edition)
by Stephen Kochan
Data Structures and Algorithms in C++ (2nd Edition)
By Michael Goodrich, Roberto Tamassia, and David Mount

Optional Reference Texts:
The C Programming Language by Brian Kernighan and Dennis Ritchie
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: Tuesdays and Thursdays 1:30PM to 2:50PM, Liberal Arts Bldg Rm. 108

Office Hours: Tuesdays and Thursdays 3:00PM to 4:30PM, Eng. Annex Rm. A-340

Course Outline:

Week 1:	Introduction
Weeks 1-2:	GNU/Linux software development environment
Week 2:	C language programming constructs: variables, algebraic expressions, simple I/O
Week 3-4:	C language programming constructs: decision statements and iterative control statements
Weeks 4-5:	Fundamental data structures: arrays and structures
Week 5:	Fundamental data structures: strings and string processing
Week 5:	Exam 1
Week 6:	C standard library: Console and File I/O
Weeks 7-8:	Fundamental data structures: pointers and linked-lists
Week 9:	Fundamental data structures: binary trees
Week 10:	Exam 2
Weeks 10-11:	Software development process
Week 11:	Software testing/verification/validation
Weeks 12-13:	Fundamental algorithms: sorting and searching

Weeks 14-15: Time and space complexity analysis of algorithms
Finals Week: Exam 3

Grading:

Class Participation/Quizzes	25%
Assignments	30%
Exam 1	15%
Exam 2	15%
Exam 3 (during Finals week)	15%

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. Software testing, verification, and validation [*CE-SWD-8*]
    a. Understand the differences between testing, verification, and validation.
    b. Demonstrate an understanding of unit testing strategies and tradeoffs.
    c. Ability to construct test vectors and use tools to automate their construction.
6. Understand the foundations of algorithm analysis [*CE-CAL-1*, *CE-CAL-2*, *CE-CAL-3*]
    a. history and the role of algorithms
    b. algorithms available in the C standard library
    c. determine time complexity of algorithms
    d. determine space complexity of algorithms
7. Understand and utilize fundamental algorithms [*CE-CAL-5*]
    a. sorting algorithms: bubble sort and insertion sort
    b. searching algorithms: linear search, binary search, and hash functions

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If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass. *CASS' Staff are the only individuals who can validate and if need be, authorize accommodations for students with disabilities.*