

EE 2372 --- Software Design I

Summer 2025

Instructor: Dr. Michael McGarry
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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: Hybrid delivery (mixture of in-class and online): Monday through Friday 9:20AM to 11:30AM in UGLC 334.

Office Hours: On demand in ENG-A340 or via Zoom.

Course Outline:

Week 1: Introduction and quick review of C language programming constructs
Week 1: Functions for code re-use
Week 2: 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 3: Exam 1
Week 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
Week 5: Exam 2

Grading:

Quizzes	35%
Assignments	15%
Exam 1 (June 25 th)	25%
Exam 2 (July 8 th 10AM)	25%

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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