

Pellissippi State Community College  
Master Syllabus

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**DATA STRUCTURES**  
**CSIT 1400**

Class Hours: 3.0

Laboratory Hours: 3.0

Credit Hours: 4.0

Revised: November 2010

This course is designed for transfer credit.

Instructor:

Office:

Phone:

Email:

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**Catalog Course Description:**

Advanced problem solving and algorithm development, structured programming, data structures and applications, I/O techniques, lists, queues, trees, algorithms, and files. Program development using Unix operating system. This course is intended for University Parallel students.

**Entry Level Standards:**

The student is expected to be proficient in programming components taught in CSIT 1020. These include functions, arrays, string handling, argument passing, indirect addressing and elementary file I/O. The student is also expected to have a working knowledge of the Unix operating system, a Unix-based editor such as vi or emacs and program development in the Unix environment. The student must have math, writing, verbal and English language skills at the college level.

**Prerequisite:** CSIT 1020 or department approval.

**Textbook(s) and Other Course Materials:**

Required:

Loudon, Kyle, *Mastering Algorithms With C*, O'Reilly, 1999, ISBN 13: 978-1-56592-453-6, ISBN 10: 1-56592-453-3.

Recommended:

Kochan, Stephan, *Programming In C*; 3<sup>rd</sup>.. Edition, Developer's Library, 2005, ISBN-13: 978-0-672-32666-0, ISBN-10: 0-672-32666-3.

Kernighan, Brian & Rob Pike; *The Practice of Programming*; Addison-Wesley, 1999, ISBN-13: 978-0-201-61586-9, ISBN-10: 0-201-61586-X

**I. Week/Chapter/Topic Basis:**

**Week Topic**

- 1 Introduction, Review of C: Arrays, Strings, Pointers, Functions, Arguments and Scope of Variables, Program Structure, I/O with printf() and scanf()
- 2 I/O with printf() and scanf(), Pointer Arithmetic, Indirection, Double Indirection, Prototypes, Program Structure.
- 3 String functions.

- 4 Elementary File I/O, Make Files, Command Line Arguments
- 5 Structures, Typedef, Dynamic Memory Allocation
- 6 Lists, Stacks, Queues, Static and Dynamic Lists
- 7 Doubly Linked Lists, In-memory Conversion with printf() and scanf()
- 8 Overview of Algorithm Complexity, Binary trees, Tree Traversals, Insertions and Deletions
- 9 Mid-term Exam
- 10 AVL Trees
- 11 Splay Trees
- 12 Hashing, Binary Heaps, Sorting, Pointers to Functions
- 13 Enumerated Data Types, Unions, Bitwise Operators
- 14 B-Trees
- 15 Final Exam

## II. Course Goals:

The course will:

- A. Enhance effective use of the C programming languages. II, III, IV, V
- B. Enhance effective use of advanced C programming statements and be able to use these statements in writing a large program. I, II, III, IV, VI, V
- C. Expand student understanding of data abstraction, specification, refinement and implementation, understanding of specific structures such as lists, stacks, queues, linked-lists, hash tables and binary trees. III, IV, V
- D. Guide students to understand various searching and sorting methods and select most efficient algorithm. III, IV, V
- E. Guide students to use of various data structures in writing a large program with C. I, II, III, IV, V
- F. Guide students to write well-structured programming code using divide-and-conquer method. II, III, IV, V
- G. Guide students to use recursive techniques to solve problems when appropriate. II, V

## III. Expected Student Learning Outcomes:

Students will be able to:

1. Apply the syntax and semantics of C programming languages. A
2. Utilize advanced C programming statements in large programs. B
3. Construct simple data types, arrays, structures and unions. B
4. Implement and address abstract data structures via pointers. B, C
5. Construct links, stacks, queues, linked-list and binary tree searching. C
6. Employ trees and tree traversal. C
7. Implement and utilize recursive functions. C, D
8. Demonstrate various sorting and searching techniques. D

9. Demonstrate hashing techniques. D
10. Demonstrate heaps and their applications. D
11. Write a large program using various data structures. E, F
12. Use recursion as an alternative to linear solutions. A, B, C, G
13. Use make files to manage projects. F

#### **IV. Evaluation:**

- A. Testing Procedures: 50% of grade  
A minimum of two tests is recommended. Tests will cover material presented in class. Tests are not to be missed without a valid excuse.
- B. Laboratory Expectations: 40% of grade  
Lab attendance is required. Assignments will be given and must be completed and handed in at the designated date and time.
- C. Field Work:  
None is required.
- D. Other Evaluation Methods: 10% of grade  
Unannounced quizzes and homework will also comprise part of the final grade for the course.
- E. Grading Scale:

93 – 100	A
88 – 92	B+
83 – 87	B
78 – 82	C+
73 – 77	C
65 – 72	D
Below 65	F

#### **V. Policies:**

- A. Attendance Policy:  
Pellissippi State Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy can be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal can be addressed to the vice president of Academic.

Maintaining continuous attendance in your classes is very important. If you are considering dropping or withdrawing from a course, please check with the Financial Aid Office before doing so. Dropping or withdrawing from a class can adversely affect your financial aid and/or lottery eligibility.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to (Pellissippi State Catalog):

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor
- Taking an exam for another student

C. Accommodations for Disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office.

Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at [www.pstcc.edu/departments/swd/](http://www.pstcc.edu/departments/swd/).

D. Computer Usage Guidelines:

College-owned or –operated computing resources are provided for use by students of Pellissippi State. All students are responsible for the usage of Pellissippi State's computing resources in an effective, efficient, ethical and lawful manner. (Pellissippi State Catalog).

E. Other Policies:

Students are expected to promptly attend all lecture and lab classes. If a class is missed, it is the student's responsibility to make up all work and get notes and/or handouts. In the event that a student has an emergency beyond his/her control, he/she must notify the instructor as soon as possible.