

# CS 121 – Computer Science II / Data Structures

## Course Syllabus      Spring 2019

**Instructor:** Bruce Bolden JEB 232      [bruceb@cs.uidaho.edu](mailto:bruceb@cs.uidaho.edu)  
**Text:** *Data Structures and Program Design in C++*,  
 Kruse and Ryba, Prentice Hall, 1999.  
 (recommended) *The C Programming Language*, Kernighan & Ritchie, Prentice-Hall, 1988

**Schedule** (lecture dates may change)

Week	Day	Topic	Text
1	January 9	W Introduction/Overview F Dynamic Memory	Chapter 1
2	14	M Structs W Dynamic Data Structures: Linked Lists F Introduction to C++ Classes	Chapter 6
3	21	M <b>** MLK - Idaho Human Rights Day - NO Classes **</b> W Lists/Classes F Lists/Templates	
4	28	M Program Design W Stacks F Stacks	Chapter 2
5	February 4	M Queues W Queues F Review for Exam	Chapter 3
6	11	M Recursion W Recursion F <b>** Test 1 **</b>	Chapter 5
7	18	M <b>** Presidents Day – NO Classes **</b> W Trees F Tree Traversals	Chapter 10
8	25	W Review Exam W Binary Search Trees F Heaps	
9	March 4	M Hash Tables W Hash Tables F AVL Trees	Chapter 9
	11 - 15	<b>*** Spring Break - NO Classes ***</b>	
10	18	M Other Trees W Review of Trees F Order Analysis	
11	25	M Sorting/Searching W Sorting F Review for Exam	Chapter 8

12	April	1	M	Sorting	
			W	Sorting	
			F	<b>** Test 2 **</b>	
13		8	M	Graphs	Chapter 12
			W	Graphs	
			F	Review Exam	
14		15	M	Graphs	
			W	Graphs	
			F	Graphs	
15		22	M	Other topics	
			W	Other topics	
			F	<b>No class – Engineering Expo</b>	
16		29	M	Other topics	
			W	Other topics	
			F	Review for Final Exam	

**Final:** XXXday, May xx, 10:30 – 12:00 PM \*\*\* To be verified

### Grading

The letter grade you receive from the course will be determined as follows:

A	90% – 100%
B	89.9% – 80%
C	79.9% – 70%
D	69.9% – 60%
F	59.9% – 0%

The instructor reserves the right to adjust these percentages up or down a maximum of five (5) percent if deemed necessary.

### Typical Point Distribution

	Points
Attendance/Participation	20
Two One hour Exams	180
Final Exam	120
Quizzes (5–8)	60
Homework/Programming Projects	120
Total	<u>500</u>

### Programs

All programming assignments must be submitted as specified. Class time will not be spent on homework. No late homework assignments will be accepted.

**Quizzes**

Quizzes will normally be given most Fridays on the material covered since the last quiz. Knowledge of material in this class is cumulative. Your lowest quiz grade will be dropped. No makeup quizzes will be given.

**Exams/Final Exam**

The midterm and final exams are cumulative. No makeup exams will be given.

**Major Topics Covered**

- Algorithms, programs and data structures (3 hours)
- Pointers, with arrays, dynamic memory (2 hours)
- Program complexity concepts (2 hours)
- Linked Lists (4 hours)
- Classes / Templates (2 hours)
- Stacks (2 hours)
- Queues (2 hours)
- Recursion (2 hours)
- Trees (2 hours)
- Binary Search Trees (2 hour)
- Other Trees (2-3, AVL, Red-Black, B-trees, etc.) (1 hour)
- Hash Table (3 hours)
- Tables, priority queues, heaps (2 hours)
- Graphs (4 hours)
- Searching performance comparison (2 hours)
- Sorting techniques (insertion, merge-sort, and quick-sort) (3 hours)

**Course Outcomes (to be revised)**

- Make a description of a problem that has a straight forward computing solution, design, construct, and test a complete program that solves the problem. (c)
- Work in a small group to solve a relatively simple computing problem. (d)
- Understand the potential consequences of program failure. (e)

- Understand the expectations for academic integrity as they apply to software development. (e)
- Students will be able to document computer solutions with well written reports in a standard format that emphasizes insight into the problem solving, not just the presentation of the output. (f)
- Use a C++ compiler. (i)
- Use basic system tools (e.g., top and time) to analyze a program's behavior with respect to the use of computer memory and CPU time. (i)
- Use code libraries. (i)
- Define C++ constants and variables of type char, int, float, and double. They will know the different characteristics of these data types and when each type should be used. (j)
- Understand how to use type casting and how the compiler converts between types in mathematical/logical expressions. (j)
- Create correctly formatted C++ expressions using the following operators: +, -, #, %, ( ), and []. (j)
- Build program units consisting of the sequence, selection, and repetition programming structures of C++. More specifically they will be able to determine under what conditions each of the following structures should be used: Sequence: assignment statement; Selection: if, if-else, if-else if-else, and switch structures; Repetition: for, while, and do-while structures. (j)
- Read/Write information to/from files. (j)
- Create and call functions having arguments and return values. They will know when arguments should be passed by value or reference. (j)
- Use and manipulate one and two dimensional arrays. (j)
- Use and understand the use of recursion. (j)
- Understand how to allocate memory dynamically using arrays and pointers. (j)
- Use and manipulate singly-linked lists using pointers. (j)
- Create simple classes having data members and member functions. They will be able to read class header files and be able to call object member functions defined in the header files. (j)

**Center for Disability Access and Resources (CDAR) Reasonable Accommodations Statement** Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through the Center for Disability Access and Resources located in the Bruce M. Pitman Center, Suite 127 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course.

Phone: 208-885-6307

Email: [cdar@uidaho.edu](mailto:cdar@uidaho.edu)

Website: [www.uidaho.edu/current-students/cdar](http://www.uidaho.edu/current-students/cdar)

### **University of Idaho Classroom Learning Civility Clause**

In any environment in which people gather to learn, it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning.

Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. Additional resources for expression of concern or requesting support include the Dean of Students office and staff (5-6757), the UI Counseling & Testing Center's confidential services (5-6716), or the UI Office of Human Rights, Access, & Inclusion (5-4285).

### **Academic Dishonesty**

Academic dishonesty in any form will not be tolerated. Academic dishonesty includes, but is not limited to:

**Cheating** Using or attempting to use unauthorized materials, information, or study aids in any academic exercise. The term "academic exercise" includes all forms of work submitted for a grade earned in a course that generates credit hours.

**Fabrication** Falsification or invention of any information or the source of any information in an academic exercise.

**Collusion** Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty.

**Plagiarism** Copying or imitating the language, ideas, and/or thoughts of another author and passing off the same as one's original work.

If academic dishonesty is suspected, I will withhold a grade until we have discussed the circumstances. Any work that I determine is dishonest will receive an automatic F and you may receive an F for the course. I will also forward a report of the incident to the Dean of Student for prosecution in accordance with the University of Idaho Student Code of Conduct.

Do your assignments on your own. Consulting with friends is permitted. However, blatant copying will not be tolerated and will be dealt with according to the guidelines on academic dishonesty: University of Idaho Academic Integrity.