

# **CSS 502 Data Structures and Object-oriented Programming II Winter 2017**

## **University of Washington Bothell, Computing & Software Systems**

<http://courses.washington.edu/css502/zander>

MW 6-7:40 pm, UW1-220

**Professor:** Dr. Carol Zander  
Office: UW1 – 260  
Email: [zander@u.washington.edu](mailto:zander@u.washington.edu)

**Office Hours:** M, W 4 – 5 pm  
W after class  
M if you tell me to stay, 10pm  
or by appointment

### **Overview:**

The course is a continuation of CSS 501 and covers advanced data structures including trees, balanced trees, heaps, graphs, and hash tables along with associated algorithms. Students learn how to analyze a problem and design and implement a solution using object-oriented design and programming with a focus on inheritance and polymorphism. Advanced data structures are incorporated into their software implementations. Good software engineering practices are used throughout. Formal notation for a programming language is introduced through automata theory.

**Prerequisites:** 2.7 in CSS 501 (or equivalent)

### **Learning Objectives:**

- Critical problem solving skills related to advanced software development
- An understanding of trees, balanced trees, heaps, and hash tables and their uses
- An understanding of the graph data structure and associated algorithms
- Ability to design and implement a complex object-oriented problem
- Ability to incorporate polymorphism and inheritance in software applications
- Make good use of software engineering practices in developing programs
- An understanding of the formal notation for a programming language

**Textbook:** Data Abstraction & Problem Solving with C++ , Frank M. Carrano, Addison-Wesley

### **Policies:**

Computer use during lecture is limited to taking notes. No social networks, email, games, etc. The bottom line is that you are not allowed to display images on your screen during lecture as it is distracting to your neighbors trying to learn. No cell phones. Keep whispering to a minimum.

Pay attention to the catalyst due date. Recall catalyst can be slow, so don't wait for the last minute. Assignments will only be accepted via catalyst. Unless we have spoken about the circumstances and prior arrangements have been made, an assignment not turned in receives a grade of zero.

Written assignments or any hard copies are expected to be turned in before the start of lecture.

No make-up exams will be given except under exceptional circumstances.

To request academic accommodations due to a disability, please contact Disability Resources (DRS) at 425.352.5307, 425.352.5303 TDD, or [uwbdrs@uw.edu](mailto:uwbdrs@uw.edu). Please discuss any needed accommodations with me.

If you are a student who has served in our nation's military forces, if desired, please feel comfortable to confidentially self-identify yourself to me so I can help you make a successful transition from the military to higher education.

### **Assignments / Grading:**

Homework /programming assignments:	35%
Midterm:	30%
Final exam:	35%

In general, a student who achieves 80% of the possible points should expect to receive a 3.0 course grade.

**Academic Integrity:**

Work is to be done independently unless directed otherwise; collaboration of work is NOT acceptable. You may discuss the problem statement with each other or help debug, but any actual work to be turned in, must be done without collaboration. This class is run by honor code. By taking this class, you agree that you will not collaborate inappropriately on any work. In some cultures, family relationships and their loyalty are considered above all others. In this course, we are an academic family and you betray the instructor's and the university's trust should you violate the honor code. For the student conduct code, see: [http://www.uwb.edu/academic/policies/Academic\\_Conduct.xhtml](http://www.uwb.edu/academic/policies/Academic_Conduct.xhtml)  
 For Academic Integrity and Plagiarism Prevention Resources: <http://guides.lib.uw.edu/bothell/ai>

There is much public code out there, even for course assignments. You are not allowed to use or to even view others' assignment code and will receive a failing grade. This is taken seriously and can lead to expulsion. Nor are you allowed to post your assignment code to any public website, ever.

**Tentative Schedule (subject to change, material coverage may run over)**

Also note that not all topics in a chapter where a whole chapter is listed will be covered. Use the topic list as a guide. The edition, 5<sup>th</sup> or 6<sup>th</sup>, is in parentheses.

Week	Date	Topic	Reading	Assignments
1	Jan 4	Preliminaries, Tree introduction	Chapter 10 (5 <sup>th</sup> ), 16 (6 <sup>th</sup> )	
2	Jan 9 Jan 11 Jan 14	Huffman encoding, Binary Search Tree Trees continued, Priority Queues, Binary Heaps	Chapter 11.2 (5 <sup>th</sup> ), 13.3, 17 (6 <sup>th</sup> )	Hw 1 due
3	Jan 16 Jan 18 Jan 22	Holiday – Martin Luther King (no school) Graphs (Dijkstra Shortest Path)	Chapter 13 (partial, 5 <sup>th</sup> ), 20 (partial, 6 <sup>th</sup> )	Hw 2 due
4	Jan 23 Jan 25	Graphs cont. (Depth/Breadth-first) Binary Heaps continued		
5	Jan 30  Feb 1 Feb 4	Balanced Trees (AVL, 2-3, B-tree)  Balanced Trees cont., Retrieval (trie)	Section 12.1, 14.3 (partial, 5 <sup>th</sup> ), 19.1, 19.2.1-2.3, 19.5, 21.3.3 (6 <sup>th</sup> )	Hw 3 due
6	Feb 6 Feb 8	Object-oriented Design/Programming <b>Midterm exam</b>	Section 1.1-1.2 (5 <sup>th</sup> ), 1.3 (6 <sup>th</sup> )	
7	Feb 13  Feb 15  Feb 20	Inheritance/Polymorphism, Hash Table introduction Factory, Inheritance /Polymorphism under the hood <b>Last day to drop</b>	Section 8.1 (5 <sup>th</sup> ), interludes (6 <sup>th</sup> ) Section 12.2-12.3 (5 <sup>th</sup> ), 18.4 (6 <sup>th</sup> ) Sample code	
8	Feb 20 Feb 22	Holiday – Presidents' Day (no school) Hash Tables continued, Design Review		Hw 4 design due (in lecture)
9	Feb 27  Mar 1	Languages Introduction,  Regular expressions	Section 8.2 (5 <sup>th</sup> ), interludes (6 <sup>th</sup> ), Notes Notes	
10	Mar 6  Mar 8  Mar 11	Context-free Grammars  Turing Machines, Last day stuff	Notes Section 5.2 (5 <sup>th</sup> ), 5.1 (6 <sup>th</sup> ) Notes	Hw 4 due - implementation
11	Mar 15	<b>Final exam (in class)</b>		