

# WSU Computer Science 223 (Cpt S 223)

## Advanced Data Structures - Fall 2013

Instructor: Brian LaMarche ([brian.lamarche@email.wsu.edu](mailto:brian.lamarche@email.wsu.edu))

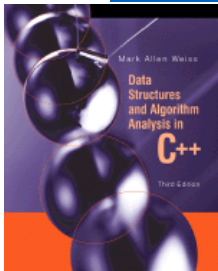
### Course Information

Prerequisites: CptS 122, Math 216, or equivalent.

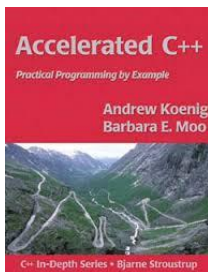
I am available any time after 5 pm M-Th for office hours. Please give me at least a one day notice before scheduling office hours.

### Required Textbooks

- **Data structures and algorithm analysis in C++**  
# Author: Mark Allen Weiss  
# Publisher: Addison Wesley/Pearson; 3<sup>rd</sup> Edition (February 28, 2006)  
# Errata: [http://www.cs.fiu.edu/~weiss/dsaa\\_c++3/errata.html](http://www.cs.fiu.edu/~weiss/dsaa_c++3/errata.html)



- **Accelerated C++: Practical programming by Example**  
# Author: Andrew Koenig, Barbara E. Moo  
# Publisher: Addison Wesley/Pearson; 1<sup>st</sup> Edition (January 15, 2000)



## Course Objectives

This course is intended to further develop your skills and understanding of Data Structures. You are expected to become familiar with:

*Abstract data types, classes and inheritance, self balancing trees, B-Trees, Algorithmic Complexity assessment, efficiency through proper data structure use, associative arrays, hashing, memory management, and introduction to concurrency and graph theory. We will be using the C++ programming language for all programming assignments.*

I expect that you have a strong grasp on the following: linked lists, queues, binary search trees, stacks, pointers, arrays, basic control structures, and the C programming language. You should be familiar with basic file I/O operations. I will assume you also have been introduced to make files and have a firm grasp using Linux.

**Attendance** – This course meets requirements for state legislated credentials; therefore, attendance is mandatory. Students are expected to attend each scheduled class punctually and remain for its entirety. Tardiness and/or leaving during breaks or during class session will be counted as an absence. According to WSU policy, “absences impede a student’s academic progress and should be avoided.” When class attendance is not possible, an absence will be excused if the student provides written verification that it falls under University guidelines, i.e., “illness, personal crises, mandated court appearances, parental responsibilities, and the like.” Such absences may be accommodated when contact is made in advance and all work is completed within the assigned week. Unless an extreme circumstance arises, a third absence will be considered excessive and result in a grade no higher than a B regardless of the quality of student work. Missing four class sessions constitutes 25% of the course. Upon a fourth absence, excused or unexcused, we counsel students to drop the course. If you are going to be absent for any reason, you must notify your instructor via email or telephone prior to class. Students are responsible for providing the instructor with written notification regarding the date and reason for their absence.

- No computers are allowed in class unless the instructor has designated the day to use computers.
- No cell phones are allowed.
- You will be asked to leave the classroom if you are using your computer or phone during lecture. I will count this as an absence.

### Quizzes/Exams

- Quizzes are open notes (paper only). Closed book.
- Exams are closed book and closed notes

### Homework

- Homework is due at the start of class (4:15 PM) at the start of class.
- *No late homework is allowed. Homework that is one second late, is late. No exceptions, period.*
- Programming assignments must be electronically submitted via Angel (unless otherwise instructed by the instructor). You must ALSO SUBMIT A HARDCOPY OF YOUR CODE! If you do not submit a hardcopy you will receive no credit.
- You must use the following name convention. Homework without using this convention will not be graded.
  - homework#\_lastName\_firstName.tar.gz
- Homework should be submitted with a Makefile. I should be able to type the below on the command line.
  - make clean
  - make all
- The makefile command (*make all*) should produce a binary program called "homework#" where the # is homework assignment number.
- The makefile command (*make clean*) should remove all compiled code.
- You should use the g++ compiler. I will test your code via *elec.tricity.wsu.edu*. I advise you to use Linux to develop your software. However, you may choose to program in another environment. If so I advise you to test your program on *elec* before submitting.
- If your program does not compile, you will receive no credit for the assignment. No resubmissions are allowed after the deadline has passed. I

will use the latest submission during grading if you choose to resubmit before the deadline. You are encouraged to submit before the deadline.

- I will post homework on Angel (<https://lms.wsu.edu/>) on the assigned date. I will attempt to do so before class begins. You are responsible for reviewing the homework.
- Due dates will be provided on the homework sheet.

**Programming Grading and Coding Standard** – Below are guidelines for your code. You will be docked points if you do not follow these simple guidelines.

- No magic numbers
- Comments required over every function/method/type definition/class
- Comments are required to describe major blocks of code.

## Grading

- Homeworks – 600 points – 6 total – 50%
- Quizzes – 300 points – 3 total – 25%
- Exams – 300 points – 3 total – 25%

|              |    |
|--------------|----|
| 95 – 100     | A  |
| 91-94        | A- |
| 87-90        | B+ |
| 84-86        | B  |
| 81-83        | B- |
| 77-80        | C+ |
| 74-76        | C  |
| 71-73        | C- |
| 67-70        | D+ |
| 60-66        | D  |
| 59 and below | F  |

Decimal portions of scores are rounded up (e.g. 70.1 = 71). Grades are not based on a curve.

**Lectures** – Lecture notes are intended to be a basis for class discussion and may not be complete as many concepts will be discussed interactively on the

whiteboard. I will not post lecture notes online. It is up to you to take diligent notes. If you do miss class, you should collaborate with your colleagues to make sure you are familiar with the material discussed in class.

## Schedule

Homework dates listed are the assigned dates.

| Week | Subject   |
|------|---|
| 1    | Introduction – Review of data structures – Stacks, Queues, Trees / Big O – <b>HW1</b> |
| 2    | Classes / C++ Review  |
| 3    | Classes / Abstraction / C++ <b>HW 2 - Quiz 1</b>                                      |
| 4    | Trees Binary / AVL / B-Trees  |
| 5    | Trees Binary / AVL / B-Trees – <b>HW 3</b>  |
| 6    | Red Black Trees / k-d Trees – <b>Exam 1</b>   |
| 7    | Red Black Trees / k-d Trees <b>HW 4</b>   |
| 8    | Hashing – Sets / Dictionaries Maps <b>Quiz 2</b>                                      |
| 9    | Sorting / Searching / Decision Trees –  |
| 10   | Priority Queues / Heaps <b>Exam 2</b>   |
| 11   | Graphs – Searching Algorithms -- <b>HW 5</b>  |
| 12   | Graphs – MST  |
| 13   | PATRICIA Trees / TRIES <b>HW 6 / Quiz 3</b>   |
| 14   | PATRICIA Trees / TRIES  |
| 15   | Memory Management / Garbage Collection  |
| 16   | <b>Final – Non comprehensive</b>  |
|      |   |

**Expectations** – I care about your learning. I will do everything in my power to clearly and concisely explain the concepts of this course. However, you are expected to be in charge of your learning as well. You should go beyond lectures to learn more about the subject matter. If you do not understand something about the material ask questions or see me outside of lecture. I expect you to come to class prepared and ready to learn. I will treat you as a professional developer as I would at work. I expect the same and amongst your peers.

**Disability Accommodations** – Reasonable accommodations are available for students who have a documented disability. If you have a documented disability, even temporary, make an appointment as soon as possible with the Disability Services Coordinator, Cherish Tijerina, 372-7352, [ctijerina@tricity.wsu.edu](mailto:ctijerina@tricity.wsu.edu). You will need to provide your instructor with the appropriate classroom accommodation form. The forms should be completed and submitted during the first week of class. Late notification may delay your accommodations. All accommodations for disabilities must be approved through Disability Services. Classroom accommodation forms are available through the Disability Services Office.

**Safety** – Should there be a need to evacuate the building (e.g., fire alarm or some other critical event), students should meet the instructor at the Cougar statue directly outside of the West building. A more comprehensive explanation of the campus safety plan is available at <http://www.tricity.wsu.edu/safetyplan/>. The university emergency management plan is available at <http://oem.wsu.edu/emergencies/>. Further, an alert system is available. You can sign up for emergency alerts (see <http://alert.wsu.edu>) through the zzusis site (<http://portal.wsu.edu>).

**Academic Integrity** – Academic integrity is the cornerstone of the university. Any student who attempts to gain an unfair advantage over other students by cheating will fail the assignment and be reported to the Office of Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions:

<http://www.studentmediagroup.com/planners/palouse2012/#/18/>

*Specifically:* No sharing code

Discussing homework is encouraged. This goes as far as discussing the problem on a whiteboard, however, no pair programming allowed. Submit your own work.

**Disclaimer** – This lecture topics order is subject to change based on progress. Changes will be communicated within a reasonable amount of time before lectures. I may move the course material and homework postings to a website depending on how the Angel system works out.