

COSC 2030 - Computer Science II

Introduction to Data Structures & Algorithms

University of Wyoming - Department of Computer Science

Fall 2017

Course Information

Location: College of Business 21

Meeting Time: T/R 11:00AM - 12:15PM

Professor: Dr. Mike Borowczak

Office Hours: R/F ~ 2:30-5:00PM by appointment using <http://bit.ly/dmb-ohs>

Office: Engineering 4071B

TA/GA & Lab Instructor: Rafer Cooley

Office Hours: W 1:00-4:00PM ; F 1:00-3:00PM

Office: Engineering 4070

Course Websites:

Course: <http://cs.uwyo.edu/~mborowcz/cosc-2030/17fs>

Slack: <https://uwyo-cosc.slack.com/>

Pre/Co-Requisites

Pre-Requisite COSC 1030 - Computer Science I

Co-Requisite COSC 2030 Lab Section (10 or 11)

Course Description

This course explores fundamental data structures in computer science. You will show your mastery of various data structures by implementing them in C++. Examples of some of the data structures that you will encounter include: linked lists, stacks, queues, trees, heaps, hash tables, and graphs. You will also explore fundamental algorithms related to tree/graph traversal, hashing, sorting, and more. This course is followed by COSC 3020 which focused more on the *design and analysis* of algorithms.

Course Objectives and Learning Outcomes

This course builds on the introduction to object-oriented programming begun in COSC 1010 and 1030 with an emphasis on data structures, and software engineering. This course will consist of traditional lectures, flipped classroom activities, lab-assignments, mini-projects, a final culminating project, and exams.

Some notes:

While C++ offers a powerful standard template library (STL), **unless otherwise specified all assignments must be completed without the use of the STL.**

You'll be using pointers quite a bit in this course. While we'll cover them in detail - Stanford has a great document here: <http://cslibrary.stanford.edu/102/PointersAndMemory.pdf>.

Course Topics

- COSC 1030 Review (Review of C++)
- Algorithm Analysis (overview)
- Lists, Stack, and Queues
- Trees
- Hashing
- Priority Queues and Heaps
- Advanced Data Structures and Implementation (time permitting)

Texts and Software

- *Data Structures And Algorithms In C++ (4th edition) by Mark Allen Weiss*. Available online and also in print
or
- *Data Structures And Algorithms In C++ (4th edition) by Adam Drozdek*. It's what the bookstore ordered...

Assessments

Participation & Attendance (50 points) Measured through informal assessments; -2pt per absence after the 2nd "unexcused" absence.

Lab Assignments (200 points - 12 @ 20 pts each, drop the lowest 2)

Homework (300 points - 6 @ 50 pts each) These are time consuming. Plan accordingly.

Final Project & Presentation (100 points) A group project - details coming soon!

Midterm Exam (150 points) Covering lecture and homework materials.

Final Exam (200 points) All inclusive, covering material from lecture, labs, homework, and the final projects.

Grade Policies

Your final grade (FG) will be computed as a direct unweighted sum of the all the in-class participation (P), homework (H), labs (L), final project (FP), and exam scores (ME, FE).
 $FG = P + H + L + FP + ME + FE$.

The following point boundaries will be used to determine final grades.

G	Letter Grade
>899	A
800-899	B
700-799	C
600-699	D
<600	F

G mod 100	Grade Modifier	G mod 100	Grade Modifier
≥ 94	none	>96	+
<94	-	94-96	none
		<94	-

If necessary, all or any results will be curved. The curve will only ever be upwards (i.e., only ever in your favor). Average numerical grades will be rounded to the nearest whole number (that is, 799.5 becomes 800 and a B, 799.4 becomes 799 and a B). I may relax these grade boundaries but only ever in your favor (i.e., it might be possible that the A grade boundary ends up being 880 instead of 899.0...).

A summary of your grades will be posted on UW's WyoCourses site. Please review your scores and report any discrepancies to me.

Late Work

Late work will only be accepted for credit 24 hours after the assignment due date . You will receive a maximum of 75% of the earned points for late work submitted within 24 hours of the due date. E.g. if an assignment is worth 25 points, is submitted 22 hours after the due date, and would have received 20 points if submitted on time, the late-score would be computed as

$$\frac{20}{25} \times \frac{3}{4} = \frac{15}{25}$$

Late work that is submitted after the due date **and** prior to final exam will remain ungraded until the end of the semester. At the end of the semester - the late work will only be graded, **at the sole discretion of the instructor**, if it affects *the pass/failure of the course*. **The maximum course grade you can receive in this scenario is a C**. Late work will not be accepted after the final exam. Late work must still adhere to all other policies and guidelines (e.g. Academic Honesty - see below.).

Miscellanea: Extra Credit, and Expectations

No separate extra credit assignments will be offered. Assignments and projects may contain an opportunity to gain extra credit.

Attendance/Participation Policies

It is expected that you attend class regularly, and your grade will be affected positively if you are present in class. As an active and engaged learner, you are expected to attend and arrive punctually to our scheduled classes. engagement throughout the class is critical to your ultimate learning. Your participation and attendance will contribute to 5% of your overall grade.

1. University-sponsored absences are cleared through the Office of Student Life;
2. Student Health or your private physician may issue a statement giving the dates of students confinement whether in the home or hospital due to illness;
3. Roads & Weather: if you regularly travel from outside of Laramie, please let me know now. If the University remains open, and the road conditions prevent you from attending physically, we can set up some web-based video-call given sufficient notice;
4. If you have a conflict (expected or not), please let me know as soon as possible;
5. After the second "unexcused" absence, -2pts / class.

Academic Honesty

The University of Wyoming is built upon a strong foundation of integrity, respect and trust. All members of the university community have a responsibility to be honest and the right to expect honesty from others. Any form of academic dishonesty is unacceptable to our community and will not be tolerated. Teachers and students should report suspected violations of standards of academic honesty to the instructor, department head, or dean.

Any and all suspicions of academic dishonesty shall be investigated in accordance with UW Regulation 6-802 (http://www.uwyo.edu/generalcounsel/_files/docs/uw-reg-6-802.pdf). Evidence of academic dishonesty will result in one or more of the recommended sanction, in accordance with UW Regulation 6-802 6.A.

Academic Civility

"There are several misconceptions about intellectual diversity and academic freedom... ..the narrower concept of academic freedom does not mean the freedom to say anything that one wants. For example, freedom of speech does not mean that one can say something that causes physical danger to others. In a learning context, one must both respect those who disagree with one and also maintain an atmosphere of civility. Anything less creates a hostile environment that limits intellectual diversity and, therefore, the quality of learning."

Association of American Colleges and Universities

Board of Directors Statement on Academic Freedom and Responsibility 12/21/05

Disability Support Services

If you have a physical, learning, sensory or psychological disability and require accommodations, please let me know as soon as possible. You will need to register with, and possibly provide documentation of your disability to University Disability Support Services (UDSS) in SEO, room 109 Knight Hall. You may also contact UDSS at (307) 766-6189 or udss@uwyo.edu. Visit their website for more information: www.uwyo.edu/udss.

Expectations

Student's Role & Expectations

You are expected to treat all members of the class and your instructor with respect. Plan to attend class, take an active part in discussion or teamwork, and complete all readings and assignments by the deadlines listed in the syllabus.

Professor's Role & Expectations

I will follow a professional code of behavior and responsibility. I will treat all members of the class with respect. I will attend class and take an active part in your learning. In each class I will ask: 1) What do I want you - my students - to learn? 2) How will you learn it? 3) What do I want you to do with the information? and 4) How will I assess your learning?

Assessments

Lab

The laboratory assignments will include a specific grading rubric and/or testbench. Generally, you will be expected to turn in repository that contains the following:

- `doc`, which contains documentation/reports of **your own work** using any provided L^AT_EX, Word or markdown (`md`) templates;
- `src` any code used in generating your answers (code, dependencies, Makefiles as needed),
- a `README.md` file that contains the name of the lab as well as a list of collaborators, as well as citations to any sources used (e.g. blogs, information exchange sites, papers, etc).

Submissions MUST be made using classroom.github.com link that will be provided each week. Code check-in's and updates are a great way to show ownership over time. While labs are meant to be completed during the lab section meeting, **they are due no later than 11:59AM (Mountain) on the Monday following the lab.**

EXCEPTION NOTICE Lab 0 will be assigned on Sept. 5 during class and will introduce you to git, github, and classroom.github.com

Homework

Each of the 6 homework assignment will include a specific grading rubric. Generally, you will be expected to turn in:

- `doc`, which contains documentation/reports of **your own work** using any provided L^AT_EX, Word or markdown (`md`) templates;
- `src` any code used in generating your answers (code, dependencies, Makefiles as needed),
- a `README.md` file that contains the name of the lab as well as a list of collaborators, as well as citations to any sources used (e.g. blogs, information exchange sites, papers, etc).

Submissions MUST be made using classroom.github.com link that will be provided each week. Code check-in's and updates are a great way to show ownership over time. Homework deadlines will be communicated with the assignment description.

The planned set of homeworks is show below. Note that the list may be modified based on the trajectory of the course. Check the website for updates.

- HW1 - Lists
- HW2 - Stacks
- HW3 - Queues
- HW4 - Trees
- HW5 - Hashes
- HW6 - Priority Queues & Sorting

Final Project

Objective: TBA

Overview

This project enables you to have a real-world experience that you bring to an interview, your own research, or some personal project. As with any real-world endeavor, you must be able to effectively communicate your work to your peers (experts and non-experts alike).

You will work in teams of 3 or 4 (teams of $n < 3$ or $n > 4$ are highly discouraged barring special needs or requirements). If you have a case for teams sizes not equal to 3 or 4 please come talk to me.

Deadlines

The poster presentation will be held during our final day of class. In the event of a weather calamity day, the exam period will be split to accommodate the poster presentations.

Syllabus Change Policy

This syllabus is only a guide for the course and is subject to change without advanced notice.¹

Tentative Course Schedule

28 scheduled meetings, including 2 flex topics of your choice (and/or a buffer).

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Aug 28th	29th 1	30th	31st 2	Sep 1st	2nd
4th Labor Day - No Lab Meeting	5th 3	6th	7th 4	8th	9th
11th L0 Due; L1	12th 5	13th	14th 6	15th	16th
18th L1 Due; L2	19th 7	20th	21st 8	22nd	23rd HW #1 Due
25th L2 Due; L3	26th 9	27th	28th 10	29th	30th
Oct 2nd L3 Due; L4	3rd 11	4th	5th 12	6th	7th HW #2 Due
9th L4 Due; L5	10th 13	11th	12th 14	13th	14th
16th L5 Due; L6	17th 15 Midterm Exam	18th	19th 16	20th	21st HW #3 Due
23rd L6 Due; L7	24th 17	25th	26th 18	27th	28th
30th L7 Due; L8	31st 19	Nov 1st	2nd 20	3rd	4th HW #4 Due
6th L8 Due; L9	7th 21	8th	9th 22	10th	11th

¹Last updated on August 30, 2017 by Mike Borowczak — mborowcz@uwoyo.edu

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
13th L9 Due; L10	14th 23	15th	16th 24	17th	18th HW #5 Due
20th L10 Due; Proj Time	21st Thanksgiving Break Bonus	22nd	23rd Thanksgiving Break	24th	25th
27th L11	28th 25	29th	30th 26	Dec 1st	2nd
4th L11 Due; Proj Time	5th 27 Presentations Part 1	6th	7th 28 Presentations Part 2	8th	9th HW #6 Due
11th	12th 29	13th	14th 30 Final Exam @ 10:15 AM	15th	16th