CSCI 362: Data Structures

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E-mail: william.killian@millersville.edu	**Lecture:**
Web: cs.millersville.edu/~wkillian/2020/spring/csci362	Section 01: TR 8:00AM - 9:50AM
Office: Roddy 141	Section 02: TR 10:00AM - 11:50AM
Classroom:	**Office Hours:**
Tuesdays: Roddy 147	M F 10:00AM - 12:00PM
Thursdays: Roddy 136	W 1:00PM - 2:00PM

Course Description

This course is a systematic study of data structures and their algorithms, organized around the unifying concept of data and code abstraction. Emphasis is placed on ADT-based and object-oriented design, incremental development and testing, and comparison of data structure implementations. Topics include abstract data types (ADTs), objects, algorithm design and analysis, trees, sorting, searching, hash tables, and graphs. This course includes a laboratory component and is currently taught using C++.

Prerequisite(s): Grade of C- or better in both CSCI 140 and CSCI 162

Course Outcomes

At the end of this course, a successful student will be able to

1. Implement elementary data structures such as linked lists, stacks, queues, and binary trees;

2. Apply a variety of more advanced data structures, such as hash tables, balanced search trees, and graphs, to solve problems;

3. Perform simple algorithm complexity analyses;

4. Formulate divide-and-conquer algorithms using recursion; and

5. Describe the importance and key points of a professional code of ethics.

Textbook

- *Note:* The textbook is optional but highly recommended

- Weiss *Data Structures and Algorithm Analysis in C++, 4e* ISBN: 978-0132847377

- The textbook errata can be found here.

Course Policies

Responses

I will respond to emails within 24 hours unless an exception is noted through email, D2L, or in class. Please note that this means if you email me the night before an exam or assignment submission, I am not guaranteed to respond. Start labs when they are assigned.

Announcements

I will frequently post announcements through email and new/additional material on the course website. Under inclement weather, due dates may be pushed back or changed at my discretion, so please pay attention to all announcements.

D2L (Desire2Learn)

Link to D2L I will primarily use D2L as the grade portal for classes. The submission portion may also be leveraged for homework assignments. Lecture material and notes are accessible through the course website (found on my homepage).

Office Hours

I hold office hours for your benefit. Please do not hesitate to show up to office hours! If you find that my office hours do not fit your schedule, let me know so we can arrange for a time that does work.

My Expectations of Students

- Arrive prepared and on time for class

- Engage in active discussion during lecture

- Ask questions. Do not hesitate to clarify a concept

- Do your best work and be confident in your abilities

- Check email frequently for announcements and additional information

- Adhere to Millersville University's Academic Honesty Guidelines

Lecture

Attendance of the lecture is mandatory. I encourage everyone to make an active attempt toward participating. There are times where many examples throughout the lecture are better suited to be done with pen and paper. Please refrain from using your computer for any other reason than note-taking for the class. I also do not expect to see any mobile phones in use during class. I will ask you to leave my class if I observe misuse of technology.

Laboratory

Attendance of any laboratory component is also mandatory. Assignments will be given and will most likely take more time to complete than the lab period. You are permitted to leave the lab period if and only if you have completed the assignment. **Missing lab periods will result in a 2% grade reduction per occurrence**

Grading Policy

- **<u>40%</u>** of your grade will be determined by two exams during the semester

- **<u>30%</u>** of your grade will be determined by laboratory and homework assignments

- **<u>30%</u>** of your grade will be determined by a semi-cumulative final exam

- Up to **<u>2%</u>** will be added to your grade *at the professor's discretion* based on active participation during lecture and laboratory periods.

I will grade on a ten-point grading scale. I will **NOT** round any grades. An 89.51 will be classified as a B+

≥ 93	≥ 90	≥ 87	≥ 83	≥ 80	≥ 77	≥ 73	≥ 70	≥ 67	≥ 63	≥ 60	< 60
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

YOU **MUST ATTEMPT** ALL EXAMS, HOMEWORKS, AND ASSIGNMENTS TO PASS THE COURSE.
YOU **MUST** EARN AT LEAST A 70% EXAM AVERAGE TO EARN A C- IN THIS COURSE.

Labs

Labs will have a grading turnaround time of one (1) week from the due date. Lab grades can only be contested for up to one week from when the grade is posted on D2L. **Three grace days** will be provided throughout the semester without penalty. **Otherwise, no late submissions will be permitted.**

Homeworks

Homework assignments will be submitted digitally through D2L or Autolab (depending on which is more appropriate). **No late submissions will be permitted with homework assignments**. All homeworks will have a grading turnaround time of one (1) week from the due date. Homework grades may only be contested for up to one week from when the grade is posted on Desire2Learn.

Exams

Exams will be graded by the next class (e.g. Tuesday-Thursday class with a test on Thursday will have the tests returned the immediately following Tuesday. **You do not get to keep your exams.** Failure to return an exam will result in an updated grade of zero (0). I will hand them out in class and go over any answers, but I will collect them during the class period.

University Policies

Academic Dishonesty Policy

- **Things you may do:**

    - Discuss approaches to solving a problem, as long as the discussion remains **above the level of detail** expected for the course.
    - Seek aid in resolving compiler messages.
    - Email me or visit me during office hours.
    - Go to tutoring to ask about theoretical concepts

- **Things you may not do:**

    - Copy a code fragment verbatim
    - Copy a code fragment and rename variables
    - Visit any website with purchasable solutions (e.g. Chegg)
    - Post to or visit websites with resources to problems (e.g. StackOverflow)
    - Obtain any solution on open repositories (e.g. GitHub)
    - Obtain a solution from someone who has previously taken the class

Obtaining a solution on the Internet or elsewhere and submitting it as your own work is plagiarism and will result in severe disciplinary measures. Be sure you can explain every line of every program you submit. **Writing code is no different than writing a paper — if it was not your original idea, then you should not submit it as your own work.** If you have to question whether or not something is acceptable, it is likely **not** acceptable.

Title IX

Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment, comply with Title IX of the Education Amendments of 1972, 20 U.S.C. §1681, et seq., and act in accordance with guidance from the Office for Civil Rights, the University requires faculty members to report to the University's Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report to the person designated in the University Protection of Minors policy incidents of sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred.

Information regarding the reporting of sexual violence, and the resources that are available to victims of sexual violence, is available at http://www.millersville.edu/sexualviolence/index.php

Counseling Resources

Students sometimes face mental health or drug/alcohol challenges in their academic careers that interfere with their academic performance and goals. Millersville University is a caring community and resources are available to assist students who are dealing with problems. The Counseling Center (717-871-7821) is an important resource for both mental health and substance abuse issues. Additional resources include: Health Services (871-5250), Center for Health Education & Promotion (871- 4141), Campus Ministries, and Learning Services (717-871-5554).

Planned Course Schedule[1]

Week 01, 01/20 - 01/24:   Introduction, C++ Primer, Intro to C++ Lab

Week 02, 01/27 - 01/31:   Pointers and `std::vector`, *Lab Time*, Using `std::vector` Lab

Week 03, 02/03 - 02/07:   Implementing `std::vector`, Vector

Week 04, 02/10 - 02/14:   Iterators and `std::list`, *Lab Time*, Using `std::list` Lab

Week 05, 02/17 - 02/21:   Implementing `std::list`, List

Week 06, 02/24 - 02/28:   **Exam 1**, Using `std::set`, Sieve

Week 07, 03/02 - 03/06:   Binary Search Trees, Implementing `std::set`, `SearchTree`

Week 08, 03/09 - 03/13:   Balanced Binary Search Trees, *Lab Time*, 2-3-4 Trees

Week 09, 03/16 - 03/20:   **SPRING BREAK**

Week 10, 03/23 - 03/27:   Hash Tables, *Lab Time*, `HashMap`

Week 11, 03/30 - 04/03:   **Exam 2**, Divide-and-Conquer Sorting, Recursion Lab

Week 12, 04/06 - 04/10:   Non-Comparison-Based Sorting, Sorting Lab

Week 13, 04/13 - 04/17:   Disjoint Sets, *Lab Time*, Graphs (terminology, DFS, BFS), `DisjointSet`

Week 14, 04/20 - 04/24:   Graphs (topological sort, Prim's, Kruskals), Graph Lab

Week 15, 04/27 - 05/01:   *Lab Time*, ACM Code of Ethics, Review

Week 16, 05/04 - 05/08:   **Final**

- **Exams** will be on Tuesdays (with the exception being finals)
- *Lab Time* will be during the second half of Tuesday's lecture
- Labs will be assigned the week they are listed and be designed to complete in one week

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[1]Subject to change

My Teaching Philosophy

First and foremost, as an educator, my primary role is to support students' well-being. This includes but is not limited to: physical, mental, and emotional health. I am here to help develop students into outstanding individuals. From the academic side, I will teach key concepts related to the computer science curriculum. From the advisement side, I will support students to achieve personal success.

Teaching Methods

I will challenge students to do the absolute best work they are able to do, even if they may not have the confidence in their own abilities. I am a proponent of providing captivating lectures through consistent interaction with students and building up lectures as miniature case studies. This methodology molds well to the computer science curriculum since problem solving is a core component of the foundations of computer science.

Practical Skills

In addition to the required course materials covered, I will also cover other practical industry skills. Knowing the theory of computer science is important, but knowing how to leverage that knowledge in industry, academia, or a business setting is also just as crucial. Through the incorporation of real-life application to my lectures, it is my goal that students feel more empowered and ready for any post-graduate position they may pursue.

Self Determinism

I believe that everyone is capable of achieving greatness. Some concepts will be harder to grasp than others, but I will do my best to engage your mind. I also believe in self mastery. Self mastery does not mean that you will be an expert at everything you do. Instead, self mastery focuses on understanding yourself, specifically your thought process, learning process, and how you react to external events. You should know your strengths and your weaknesses — embrace your strengths and improve upon your weaknesses. Everyone learns in different ways. Even if you may not enjoy the material covered in my lectures, I will do my best to help expand and explore your self-awareness.

Work-Life Balance

I know the majority of students are commuting and work part time jobs. When I was a student (here, at Millersville), I also fit into this category. I understand that you wear many hats in your day-to-day life, but I also expect that you will be able to establish a good school-work-life balance. This can be a bit tricky in the beginnings of your college career, but I believe in you! If you want any examples of what to do (and not to do) I can speak from my own experiences — in no way was I an ideal student.