ARCADIA UNIVERSITY
COMPUTER SCIENCE
CS 203.1 DATA STRUCTURES AND ALGORITHM ANALYSIS

MWF, 2:45PM – 3:50PM, BOYER 14, 4 CREDITS, FALL 2021

INSTRUCTOR INFORMATION
Instructor’s Name: Dr. Vitaly Ford
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Email: fordv@arcadia.edu
Office: Boyer 328
Office hours: Refer to the schedule: https://vford.me/
[Email is the best way to set up an appointment]

COURSE INFORMATION
PREREQUISITES
CS 202 (Problem-Solving with Algorithms and Programming II)

COURSE OBJECTIVES
This course focuses on learning how to design, create, analyze, and apply data structures and algorithms to solve real world computer science problems.

COURSE LEARNING GOALS
1. Analyze runtime efficiency of algorithms related to data structure design.
2. Select appropriate abstract data types for use in a given application.
3. Compare data structure tradeoffs to select the appropriate implementation for an abstract data type.
4. Design and modify data structures capable of insertion, deletion, search, and related operations.
5. Trace through and predict the behavior of algorithms (including code) designed to implement data structure operations.
6. Identify and remedy flaws in a data structure implementation that may cause its behavior to differ from the intended design.

COURSE LEARNING OUTCOMES
1. Students develop knowledge of the most common data structures used for storing, searching for, and retrieving ordered and unordered data. The data structures include arrays, linked lists, stacks, queues, priority queues, trees, hash tables, and graphs.
2. Students develop knowledge of thoughtfully applying specific data structures to efficiently solve computer science problems.
3. Students develop knowledge of analyzing and comparing algorithms’ efficiency by utilizing Big-O notation.
4. Students implement projects, using the data structures covered in this course.
MAJOR TEACHING METHODS
Lecture, demonstrations, discussion, reading, programming assignments.

SPECIAL INSTRUCTIONAL PLATFORM/MATERIALS

Visual Studio Code extensions:

- Live Share
- When you open a Java file, it will suggest you install extra extensions -- do it. It will probably automatically install the following:
  - Debugger for Java
  - Java Extension Pack
  - Java Test Runner
  - Maven for Java
  - Project Manager for Java
  - Language Support for Java (TM) by Red Hat
- If you are into Python, then the following would be good:
  - Kite Autocomplete for Python and JavaScript
  - Install Kite engine
  - Python (by Microsoft)
- Make sure that Visual Studio IntelliCode extensions is installed as well

LEARNING RESOURCES
- We are going to use Canvas. I expect the students to check Canvas regularly.
- Me (in-class, email, office hours, by appointment).
- Tutors from the University's Learning Resource Network (LRN):
  https://www.arcadia.edu/academics/academic-support/learning-resource-network

CLASS ATTENDANCE AND PARTICIPATION
It is your responsibility to attend classes regularly. Should you have to miss a class meeting, please notify me of your absence prior to the class, and it is your responsibility to find out what has been taught that day and make up the work. The lectures will be recorded (as long as I do not forget to click on the record button) and you should be able to find links to the recordings on Canvas under Zoom section. In case of emergency, please contact me by E-mail or phone as soon as you can.

In-class participation will be rewarded with extra credit! I always remember who puts an effort and who does not. When you put an effort into your work in any class, it makes the recommendation letter stand out better in the future if you need one.
Optional textbook
Data Abstraction and Problem Solving with Java: Walls and Mirrors (3rd Edition), Janet Prichard and Frank Carrano
ISBN-10: 0132122308


Evaluation
Grade distribution
- Attendance: 10%
- Assignments: 60%
- Quizzes: 10%
- Final Project: 20%

Grading Scale

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<tr>
<th>Grade</th>
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<tr>
<td>F</td>
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<td>76-80</td>
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Note: blue numbers mean exclusive

Note: If you have an issue with a grade on ANY individual assignment, you must see me within three days of the grade being released to the class.

Calendar (tentative)
- Review of Java Fundamentals: Week 1
- Principles of Programming and Software Engineering: Week 1
- Recursion (The Mirrors): Week 2
- Data Abstraction (The Walls): Week 3
- Linked Lists: Weeks 3, 4
- Recursion as a Problem-Solving Technique: Week 4
- Stacks & Queues, Parallel Computing Concepts: Weeks 5, 6
- Algorithm Efficiency & Sorting: Week 7
- Trees: Weeks 8, 9
- Tables and Priority Queues: Week 10, 11
- Advanced Implementations of Tables: Weeks 12, 13
- Graphs: Week 14, 15

Programming Assignments and Quizzes
There will be multiple programming assignments during the semester (weekly or every two weeks). Your grade will be mostly based on programs, final project, and quizzes. Programs are due at 11:59 PM on the date specified on the assignment. Submit your programs via sharing in GitHub.

Late submissions will be accepted with a penalty: 5(2^x), where x is the number of days late. As you would soon discover (if you don’t know it already) computer assignments require time, patience, and planning. Start early and do not wait until the last moment!
There will be two quizzes: midterm and final. If you missed a quiz without a legitimate reason, no late make-up quizzes will be accepted.

**Final Project**

There will be a **final group project**. The project will include both a writeup and final presentation. More details on the final project will be given later in the class.

**Course Policies**

You are expected to adhere to the code of academic honesty of Arcadia University.

You may discuss course material and help one another. However, **borrowing others’ code or sharing implementation details is absolutely not allowed**. A simple way to avoid inadvertent plagiarism is to talk about the assignments, **but don't read each other's work or write solutions together**. For example, if two people share the same code or implementation details, both parties will be considered as conducting plagiarism.

If you are not sure, check with your instructor. Finally, I reserve the right to ask you to explain your assignments/code to me.

**University Plagiarism Policy**

When you use (for example, quote or even summarize or paraphrase) someone else’s media, words, data, ideas, or other works, you must cite your source. You should be especially careful to avoid plagiarizing Internet sources (for example, e-mail, chat rooms, Web sites, or discussion groups). It does not matter whether you borrow material from print sources, from the Internet, from online data bases, or from interviews. Failure to cite your source is plagiarism. Students who plagiarize may receive an “F” or a “0” for the assignment, or an “F” for the course. View the University Plagiarism Policy: [http://handbook.arcadia.edu/node/129](http://handbook.arcadia.edu/node/129)

**Honesty**

Copying assignments or allowing your assignments to be copied by others constitutes cheating and as such will not be tolerated. Faking your program so that it produces the sample output without implementing the underlying process is also cheating. The penalty for cheating in this course is the automatic grade of an F for your assignment. If you are caught a second time, you will automatically fail the course.

**Disability Accommodation**

Any student who feels s/he may need an accommodation based on a disability should contact Disabilities Support Services in the Office of Academic Development in Knight Hall to coordinate reasonable accommodations for students with documented disabilities.

**Title IX and Anti-Discrimination Statement**

Arcadia University is committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University’s Title IX Coordinator. The only exceptions a 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.

Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at [https://www.arcadia.edu/university/policies-guidelines/title-ix](https://www.arcadia.edu/university/policies-guidelines/title-ix).
Arcadia University is committed to providing a learning, living, and working environment that is free from discrimination. The University has an Interim Policy Prohibiting Sexual Harassment and Sexual Misconduct detailing our commitment to preventing and addressing such behavior. I understand the impact that sexual harassment and sexual misconduct can have and am committed to doing my part to foster an environment that is safe and equitable.

Please know that all faculty on campus are mandatory reporters. This means that if you disclose an experience of sexual harassment or sexual misconduct to me outside of a classroom discussion, a writing assignment, or a University-approved research project, I must share what you reported to me with Arcadia’s Title IX Coordinator. This does not mean that you will have to pursue an investigation or go through a grievance process. Even if you do not choose these options, the Title IX Office can provide supportive measures and other resources to you.

If you or someone you know has experienced sexual harassment or sexual misconduct, please know that you are not alone. If you would like to speak to someone confidentially, confidential resources are provided on the Office of Equity and Civil Rights website.

Office Etiquette

Do NOT write code or do your assignments in my office unless I explicitly ask you to. Some students wish to sit in my office (or at an empty desk around my office) and have me fix each problem as they code. You learn nothing by doing this; you must at least attempt to solve your problems yourself before coming to me.