ARCADIA UNIVERSITY
COMPUTER SCIENCE
CS 362.1 COMPUTER ORGANIZATION AND ARCHITECTURE

MWF, 1:30PM – 2:35PM, BOYER 14, 4 CREDITS, FALL 2021

INSTRUCTOR INFORMATION
Instructor's Name: Dr. Vitaly Ford
Telephone Number: (267) 620-4745
Email: fordv@arcadia.edu
Office: Boyer 328
Office hours: Refer to the schedule: https://vford.me/s
[Email is the best way to set up an appointment]

COURSE INFORMATION
PREREQUISITES
CS 202 (Problem-Solving with Algorithms and Programming II), CS 203 (Data Structures and Algorithms)

COURSE OBJECTIVES
This course focuses on learning about computer organization and architecture through studying computer components (central processing unit, memory, performance, instruction sets) as well as their interaction with programmers. The architecture of the cloud computing will be studied as well. AWS will be used as a cloud architecture practice.

COURSE LEARNING OUTCOMES
1. Students develop knowledge of the architecture and organization of a modern computer, including understanding of the interworking of the processor, different types of memory, interconnections, and input/output devices on software and hardware levels.
2. Students develop knowledge of the cloud computing architecture and types of services that can be deployed in the cloud.
3. Students develop knowledge of basic instruction sets.
4. Students develop knowledge of hardware and software parallelism and its implementation.

MAJOR TEACHING METHODS
Lecture, demonstrations, discussion, reading, assignments (including simulations).

SPECIAL INSTRUCTIONAL PLATFORM/MATERIALS
Canvas.

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**!

OPTIONAL TEXTBOOK
Computer Organization and Architecture (10th ed), William Stallings
ISBN-10: 0134101618

EVALUATION
GRADE DISTRIBUTION
- Attendance: 10%
- Interactive Simulations: 10%
- Homework Assignments: 50%
- Fight for Memory Competition: 10%
- Research Project: 20%

GRADING SCALE

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>F</td>
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<tr>
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<td>A</td>
<td>95-100</td>
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</tbody>
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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)
- Computer Evolution, Performance Issues
- Computer Interconnection
- Cloud Technologies
- Cache Memory
- Internal Memory
- External Memory
- Input/Output
- C++
- Instruction Sets
- Processor Structure and Function
- Reduced Instruction Set Computers
- Instruction-Level Parallelism
- Parallel Processing, Multicore Computers

SYSTEMS DESIGN
- Client-Server, Network Protocols
- Storage, Latency, Throughput
- Availability
- Caching
- Proxies, Load Balancers
- Hashing, Relational DB
- Key-Value Stores
- Replication, Sharding
- Leader Election, Peer-to-Peer
- Polling, Streaming, Configuration
- Rate Limits, Logging, Monitoring
- Publish/Subscribe
- MapReduce

RAILFENCE:SOTENMIWTCT32ALECAAUJCNADENSONSHOMAEALIHS6RFNESSBETIENGTOPIT
Homework
There will be five homework assignments during the semester. Homework assignments are due at 11:59 PM on the date specified on the assignment. Submit your assignments by zipping up everything needed and upload your zip file to Canvas. Homework assignments will include computer architecture essay questions, cloud-based assignments, and C++ programming assignments. Late submissions will be accepted with a penalty: $5(2^x)$, where $x$ is the number of days late.

Interactive Simulations
Two simulations (cache and RAID) will be used to illustrate key functions and algorithms in computer organization and architecture design. You will be assigned to perform these simulation experiments, utilizing pre-built web-tools.

Corruption Everywhere: Fight for Memory — Competition
You will be using a simplified assembly language environment (CodeBlue/Sabre) to build a self-replicating program that will try to re-write the opponent’s code. Fun stuff.

Research Project
There will be a group research project. The project will include both a writeup and final presentation. More details on the 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

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.

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.