# Introduction to Computer Organization

CDA 3101

***Class Periods:*** MWF Period 2 8:30-9:20 am

***Academic Term:*** Fall 2021

***Instructor:***
Cheryl Resch
cheryl.resch@ufl.edu
443-223-3562
Office Hours: Monday 9:30am-10:30am, Thursday 12:50pm-1:40pm
https://ufl.zoom.us/j/7182892352

***Peer Mentors:***
Please contact through the Canvas website

- Nathaniel Edgar
- Grant Wise
- Leonardo Torres
- Joseph Gross
- Hunter Becker
- Carlos de Guzman
- Mehron Talebi
- Michael McGaha
- Geneva Anderson

***Peer Mentor Office Hours***

| | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY | SUNDAY |
|---|---|---|---|---|---|---|---|
| 9-10 AM | | | | | | | |
| 10-11 AM | | | | | | | |
| 11AM- NOON | | | | | | | |
| NOON-1PM | | | | | | | |
| 1-2 PM | | | | | | | |
| 2-3 PM | | | | | | | |
| 3-4 PM | | | | | | | |
| 4-5 PM | | | | | | | |
| 5-6 PM | | | | | | | |
| 6-7 PM | | | | | | | |

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|---|---|---|---|---|---|---|---|
| 7-8 PM | | | | | | | |
| 8-9 PM | | | | Travis | | | |

***Course Description***
3 Credits. Organization of computing systems. Logical basis of computer structure. Machine representation of instructions and data, flow of control, and basic machine instructions. Assembly language programming.

***Course Pre-Requisites / Co-Requisites***
Prereq: COP 3504 or COP 3503; and MAC 2233, MAC 2311 or MAC 3472; COT 3100

***Course Objectives***
Students will be able to

- Calculate computer performance
- Represent simple high level language programs in ARM
- Represent ARM assembly language instructions in binary machine instructions
- Represent integers and floating-point numbers in binary
- Trace the execution of ARM instructions through simple single cycle and pipelined datapaths
- Distinguish between direct mapped, set associative, and fully associative cache designs

***Relation to Program Outcomes (ABET):***

| **Outcome** | **Coverage*** |
|---|---|
| 1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics | High |
| 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors | |
| 3. An ability to communicate effectively with a range of audiences | |
| 4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts | |
| 5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives | |
| 6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions | Meduim |
| 7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies | High |

***Required Textbooks and Software***

- Computer Organization and Design
- Patterson and Hennessy
- Zybook Code UFLCDA3101ReschFall2021
- ISBN 978-1-394-11658-4

***Course Schedule***

| Week | Module | Videos | Reading | Assignment Due |
|---|---|---|---|---|
| 8/23-8/27 | Introduction | Introduction, Computer Performance, | Zybooks 1.1 – 1.5 | Quiz - What is this class about Due 8/26 |
| 8/30-9/3 | Introduction | ISAs, Benchmarking | Zybooks 1.6-1.8-1.11 | Discussion – ISAs Due 9/2 |
| 9/8-9/10 | Digital Logic | Digital Logic 1-4 | Zybooks 7.1-7.3, 7.5, 7.7-7.8 | Quiz – Digital Logic – in discussion 9/9 Zybooks Activities Due 9/12 |
| 9/13-9/17 | ARM Instructions and Programming | ARM Arithmetic and Logic 1-3, | Zybooks 2.1-2.3, 2.5-2.7 | Quiz – ARM Programming – in discussion 9/16 |
| 9/20-9/24 | ARM Instructions and Programming | ARM Data Transfer Instructions, ARM Decisions and Loops 1-2, Leg Reference Sheet | Zybooks 2.8-2.10 | Programming Assignment 0 Due 9/23 |
| 9/27-10/1 | ARM Instructions and Programming | ARM Procedures 1-4, ARM Arrays and References | Zybooks 2.12-2.14 | Quiz – Stack Frames – in discussion 9/30 |
| 10/4-10/6 | Numbers and Arithmetic | Signed Integers, Building an ALU, Integer Multiplication, Floating Point | Zybooks 2.4, 3.1-3.5 | Quiz – Floating Point and Integer Multiplication – in discussion 10/7 Zybooks Activities Due 10/10 |
| 10/11-10/15 | Review and Midterm | | | Mid Term 10/13<br><br>Programming Assignment 1 10/17 |
| 10/18-10/22 | Single Cycle Datapath | Single Cycle Datapath 1-3 | Zybooks 4.1-4.4 | Quiz – Single Cycle Datapath – in discussion 10/21 |

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|---|---|---|---|---|
| 10/25-10/29 | Pipelined Datapath | Pipelined Datapath 1-3 | Zybooks 4.5-4.6 | Quiz – Pipelining – in discussion 10/28 |
| 11/1-11/5 | Pipelined Datapath | Pipelined Datapath 4-6 | Zybooks 4.7-4.8 | Zybooks Activities Due 11/7 |
| 11/8-11/12 | Memory | Cache Memory 1-3 | Zybooks 5.1-5.5 | Quiz – Memory – in discussion 11/11 |
| 11/16-11/20 | Memory | Cache Memory 1-3 | Zybooks 5.1-5.5 | Programming Assignment 2 Due 11/14 |
| 11/22 | Memory | 4-5, Virtual Memory | Zybooks 5.7-5.8 | |
| 11/29-12/3 | Parallel Processing | Parallel Processing 1-3 | Zybooks 4.10, 6.1-6.5 | Zybooks Activities Due 12/5<br>Analysis Project Due 12/5 |
| 12/6-12/8 | Review and Final | | | Final Exam 12/8 |

***Make-Up Policy***

Quizzes may not be made up. There is one dropped quiz. Programming assignments may be turned in up to four days late with a late penalty of 10% per day. Mid Term and Final Exam may be taken on an alternative day ONLY University approved excuse.

***Honesty Policy***

Your code for your programming assignments and the analysis assignments must be your own. You may discuss assignments with others, but copy/pasting code from other students or online resources is strictly prohibited. We will be using TurnItIn to check for plagiarism.

***Evaluation of Grades***

| **Assignment** | **Percentage of Final Grade** |
|---|---|
| Quizzes | 20% |
| Programming Assignments | 32% |
| Zybooks Activities | 8% |
| Midterm Exam | 20% |
| Final Exam | 20% |
| | 100% |

***Grading Policy***

| Percent | Grade | Grade Points |
|---|---|---|
| 93.4 - 100 | A | 4.0 |
| 90.0 - 93.39 | A- | 3.7 |
| 86.7 - 89.99 | B+ | 3.3 |
| 83.4 - 86.69 | B | 3.00 |
| 80.0 - 83.39 | B- | 2.7 |
| 76.7 - 79.90 | C+ | 2.3 |
| 73.4 - 76.69 | C | 2.0 |
| 70.0 - 73.39 | C- | 1.7 |
| 66.7 - 69.99 | D+ | 1.3 |
| 63.4 - 66.69 | D | 1.0 |
| 60.0 - 63.39 | D- | 0.7 |
| 0 - 59.99 | E | 0.0 |

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

**Grades on any assignment may be discussed with me via email or in office hours up to seven days after the grade was released.**

***Students Requiring Accommodations***
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

***Course Evaluation***
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

**In-Class Recording**
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil

proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

***University Honesty Policy***

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Conduct Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

***Commitment to a Safe and Inclusive Learning Environment***

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

***Software Use***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

***Campus Resources:***

*Health and Wellness*

**U Matter, We Care:**
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**Sexual Discrimination, Harassment, Assault, or Violence**
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

**Sexual Assault Recovery Services (SARS)**
Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

*Academic Resources*

**E-learning technical suppor***t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

**Library Support**, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

**Student Complaints Campus***:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

**On-Line Students Complaints***:* http://www.distance.ufl.edu/student-complaint-process.