CDA 5155: Computer Architecture Principles

Sections: 21829
Class Periods: Tuesday 1:55 – 2:45 pm and Thursday 1:55 – 3:50 pm
Location: McCarty Hall A (MCCA) G186
Academic Term: Fall 2025

Instructor:
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Office Hours: Tuesday 3:00 – 5:00 pm in Malachowsky Hall (MH) 4002

Teaching Assistants:
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Office Hours: Monday 3:00 – 5:00 pm in Malachowsky Hall (MH) 5200

Course Description
Fundamental design issues of processor and computer architecture, a variety of design approaches for CPU, memory, and system structure. 3 credits.

Course Pre-Requisites / Co-Requisites
CDA 3101, COP 3530, and COP 4600

Course Objectives
This course teaches students fundamental knowledge in computer architecture and microarchitecture. The course covers the basic organizations of computer systems including instruction-set architecture, execution pipeline, memory hierarchy, and I/O subsystem. It also addresses advanced processor microarchitecture issues such as dynamic instruction scheduling, branch prediction, lock-up free caches, instruction-level parallelism, multiple instruction fetch/issuing, speculative execution, etc. to improve computer processor performance. Shared-memory multiprocessor systems with coherent caches to reduce memory access latency are also covered. Finally, it outlines the verification issues of today's microprocessors.

Materials and Supply Fees: *None*

Required Textbooks and Software
- Computer Architecture: A Quantitative Approach
- John Hennessy, David Patterson, Morgan Kaufmann Publishers
- 6th Edition, 2019, ISBN: 978-0-12-811905-1
- **Free Download:** *https://tinyurl.com/55teerp8*

Recommended Materials: *None*

Required Computer: UF student computing requirement:
https://news.it.ufl.edu/education/student-computing-requirements-for-uf/

Please bring your computer to the class so that you can login to eLearning and solve the pop quiz. You also need the computer to develop and test your assignments (homework and projects).

Course Schedule

Week	***Topics***	***Assignments and Exams***
1	*Fundamentals of Computer Design*	
2	*Instruction Set Principles*	*Homework 1 (Due: Sep 16 at 11:30 pm)*
3	*Pipelining: Basic and Intermediate Concepts*	
4	*Pipelining (continued)*	*Homework 2 (Due: Sep 23 at 11:30 pm)*
5	*Instruction-Level Parallelism*	
6	*Instruction-Level Parallelism (continued)*	*Midterm (Oct 2 from 1:55 – 3:50 pm)*
7	*Review of Memory Hierarchy*	
8	*Memory Hierarchy Design*	*Project 1 (Due: Oct 21 at 11:30 pm)*
9	*Memory Hierarchy (continued)*	
10	*Multiprocessors and Thread-Level Parallelism*	*Homework 3 (Due: Oct 28 at 11:30 pm)*
11	*Multiprocessors (continued)*	
12	*Data-Level Parallelism: GPU Architectures*	*Project 2 (Due: Nov 12 at 11:30 pm)*
13	*Storage Systems*	
14	*Verification of Processor Architectures*	*Homework 4 (Due: Nov 18 at 11:30 pm)*
15	*Thanksgiving Break*	
16	*Security Attacks and Countermeasures*	
17		*Final Exam (Dec 11 from 3:00 – 5:00 pm)*

Attendance Policy, Class Expectations, and Make-Up Policy

The students are expected to attend the lectures (in person) and actively participate in class discussions. There is 10% score for class participation and pop quizzes. The pop quiz will be conducted during the lecture based on the materials covered in that lecture. You will not know when the pop quiz will be conducted. You will get the full score (10%) in participation if you get 80% in pop quizzes, prorated otherwise. There is no scope for makeup pop quizzes. Please attend the first lecture and refer to the introduction.pptx in eLearning for further details. For example, if I conduct 20 pop quizzes, and you can correctly solve 16 of them, you will get full 10% of the overall score. If you get less than 16 points in pop quizzes, your prorated score would be computed as:

(10 x total-points-quizzes)/16

The students are required to submit their homeworks and projects before the deadline through eLearning. Late submissions are allowed (up to 24 hours) with a 20% penalty. No grades for late submissions after 24 hours from the deadline. The students are required to take the midterm and final exams at the scheduled time. There would be no makeup exams except for medical emergencies with appropriate documentation.

Excused absences must be consistent with university policies in the Graduate Catalog (https://catalog.ufl.edu/graduate/regulations) and require appropriate documentation. Additional information can be found here: https://gradcatalog.ufl.edu/graduate/regulations/

Regrading Policy: A student needs to request for regarding for an assignment (homework or project) or exam within a week of when the grade is posted. The associated announcement will indicate the deadline for that assignment or exam. No regarding is allowed after the deadline has passed. The instructor may add points to each student's midterm such that the highest score in the midterm is 100%. For example, if the highest score is 110 out of 120, the midterm score for each student will increase by 10 points. Note that this increase covers various scenarios, including (but not limited to) minor mistakes in grading, lack of clarity in some questions, or level of difficulty in specific questions. Therefore, during regarding of midterm, a student will not gain any points unless the student gains more than the additional points (e.g., 10 in this example). Due to timing constraints between the final exam and the grade submission deadline, there will be no scope for regrading the final exam. However, we will add points to each student's final such that the highest score of the final is 100%. This increase in points is expected to cover any minor mistakes in grading the final exam.

Zero Tolerance Policy: You are expected to do your assigned activities (homework, project, or exams) on your own without giving any help to anyone or getting any help from anyone (including ChatGPT or other internet sources). Similarly, you are allowed only one crib sheet during the exams with hand-written notes (on one side of a US letter size paper during the midterm, and on both sides of a US letter size paper during the final). Note that the font size of the handwritten notes cannot be less than **14 pts** in Times New Roman (i.e., notes with tiny fonts will not be allowed). Any violation of the course policies will be treated as academic dishonesty and will be reported to the Dean of Student's (DSO). In case of violation, the student will receive a zero score in that assignment, an additional grade penalty, and it will be reported to the DSO.

Evaluation of Grades

Assignment	**Total Points**	**Percentage of Final Grade**
Homeworks (4)	5% each	20%
Projects (2)	10% each	20%
Pop Quizzes		10%
Midterm Exam	120	20%
Final Exam	120	30%
		100%

Grading Policy

Percent	Grade	Grade Points
91 - 100	A	4.00
86 – 90.9	A-	3.67
81 – 85.9	B+	3.33
76 – 80.9	B	3.00
72 – 75.9	B-	2.67
68 – 71.9	C+	2.33
64 – 67.9	C	2.00
60 – 63.9	C-	1.67
56 – 59.9	D+	1.33
52 – 55.9	D	1.00
48 – 51.9	D-	0.67
0 – 47.9	E	0.00

More information on UF grading policy may be found at:
UF Graduate Catalog
Grades and Grading Policies

Academic Policies & Resources
The following link provides detailed information about academic policies and campus resources: https://go.ufl.edu/syllabuspolicies

Commitment to a Positive Learning Environment
The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

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
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Pamela Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu