ECE 394, Introduction to Computer Architecture, Fall, 2024

(Computer Organization and Design: The Hardware Software Interface)

- Instructor: Abu Asaduzzaman (DRZ)
- Department: Electrical and Computer Engineering (ECE)
- Office Location: 303 Wallace Hall (303-WH) building
- Telephone: +1-316-978-5261
- Email: abu.asaduzzaman@wichita.edu
- Preferred Method of Contact: In person during office hours or e-mail
- Classroom, Day/Time: 202-EB, Tuesday & Thursday 9:30-10:45 AM
- Student/Office Hours: Tuesday 11:00-12:30 & Wednesday 10:00-11:30 AM
- Prerequisites: ECE 194 and CS 211
- Teaching Assistant (TA): Grading – Md "Raihan" Uddin
- TA Contacts: Grading – mxuddin11@shockers.wichita.edu

How to use this syllabus

This syllabus provides you with information specific to this course, and it also provides information about important university policies. This document should be viewed as a course overview; it is not a contract and is subject to change as the semester evolves. Any changes should be shared via lecture and/or Blackboard.

can be found at:

https://www.wichita.edu/about/policy/

.

Academic Integrity

Students at Wichita State University are expected to uphold high academic standards. WSU will not tolerate a lack of academic integrity. Students are responsible for knowing and following the Student Code of Conduct http://webs.wichita.edu/inaudit/ch8_05.htm

https://www.wichita.edu/about/student_conduct/ai.php

If there are homework (HW) assignments in this course, each HW will be an individual assignment (unless otherwise stated). Students can discuss with others, but they should not write the solution together; one submission (wording/coding) should be reasonably different from other submissions. “Collaboration is good, cheating is not!” There will be severe consequences for academic dishonesty. Cheating (such as copying word-for-word from other sources) in any test will automatically result a ‘Fail’ grade in this course; this grading policy applies to all parties involved (including the ones who help/show).

Course Description

This course aims to provide a strong foundation to understand computer architecture and computer design principles. It introduces computer organization using multilevel and quantitative approaches, with a focus on processors, memory hierarchy, and parallel processing. Students will learn to assess design decisions considering historical, current, and future requirements and technological constraints.

Measurable Student Learning Outcomes

After passing this course, students should be able to:

- (SO: EAC 1) identify, formulate, and solve computer system problems by applying principles of engineering, science, and mathematics (*Note: SO is Student Outcome and EAC is Engineering Accreditation Commission*)
- (SO: EAC 2) apply computer design to produce solutions that meet specified needs with consideration of public welfare and economic factors

Required Texts/Readings Textbook

Textbook: zyBooks: ECE 394: Introduction to Computer Architecture [“Computer Organization and Design: The Hardware / Software Interface, ARM Edition,” by David A. Patterson and John L. Hennessy, Morgan Kaufmann, 2017 edition.]

Students will access zyBooks directly. Instructions for students:

1) Sign in or create an account at learn.zybooks.com
2) Enter zyBook code: WIchituczyBooks 3e512 Tw 01(w)16 (i)6 (l)6764 Tc 0 Tw 0.89 19 0 Td(

Points/Percentage	Letter Grade	Grade Points	Interpretation
93 and up	A	4.00	A range denotes excellent performance
90 – less than 93	A-	3.70	
87 – less than 90	B+	3.30	
83 – less than 87	B	3.00	B range denotes good performance
80 – less than 83	B-	2.70	
77 – less than 80	C+	2.30	
73 – less than 76	C	2.00	C range denotes satisfactory performance
70 – less than 73	C-	1.70	
67 – less than 70	D+	1.30	
63 – less than 67	D	1.00	D range denotes unsatisfactory performance
60 – less than 63	D-	0.70	
0 – less than 60	F	0.00	

Assignments

List of grading assignments/components and values toward final grades are shown below. The dates for homework, quizzes, and exams will be announced in class and/or made available via Blackboard.

Grading Assignments/Components	Values (%)
Readings (as assigned on zyBooks.com)	10%
Homework (five of six, take home via Blackboard)	15%
Quiz (two of three, 30-minute during class-time)	10%
Exam-1 (~ Week 5, 65-minute during class-time)	20%
Exam-2 (~ Week 10, 65-minute during class-time)	20%
Exam-3 (cumulative, 65-minute during class-time)	25%

Extra Credit

Extra credits are possible depending on class performance. If required, extra credit assignments and their due dates will be determined around Week 10.

Late Assignments

For homework assignments, late submissions will not be accepted after five days from the original due date/time. Homework scores will not be considered for letter grades. Exceptions include documented emergency situations and prior consents.

Missed Tests

Makeup for missed tests (Quiz and Exam) will be given only when there is a genuine reason, with clear proof. It is students' responsibility to provide the proof; if the reason for missing a test is illness, a doctor's note will be required. Students should contact the instructor before any makeup test.

Teaching Assistants

Grading TA:

Md "Raihan" Uddin <mxuddin11@shockers.wichita.edu>

Office Hours: TBD

Office Room: TBD

The Grading TA (if any) is not allowed to solve student problems (any problem). The TA should grade test papers and provide feedback to students for any missing points. If students have any questions regarding the course materials or assignments, they should immediately contact the course instructor.

Syllabus Policies and Student Resources

All students should familiarize themselves with the course-related policies and student resources that can be found at: **www.wichita.edu/syllabuspolicies**

These include, but may not be limited to:

- Academic Integrity
- CARE Team
- Concealed Carry Policy
- Counseling and Prevention Services
- COVID-19 Conditions
- Definition of a credit hour
- Disability Services
- First Generation Students
- Heskett Center and Campus Recreation
- Important Academic Dates

Laboratory Information

Programming in Python is a must for coding in this course. Students in this course will need access to Beoshock, the HPC cluster at WSU, for their programming needs. There is no teaching/research lab associated to this course; however, we will provide supports so that you can perform the programming assignments. Information about Beoshock (such as how to log in and how to run TensorFlow code) will be provided via lectures. The main purpose of Beoshock is to provide students a machine learning platform so that they can write/debug/run programs for assignments and projects. The Computer Architecture and Parallel Programming Laboratory (CAPPLab) in 312 Wallace Hall may provide additional help.

Brief List of Topics to Cover

Chapter 1: Introduction

- Eight great ideas in computer architecture
- Technologies for building processors and memory
- Performance
- From uniprocessors to multiprocessors

Handout: Multilevel Computers

- Evolution of multilevel machines
- Milestones in computer architecture
- The Computer Zoo

Chapter 4: The Processor

- Building a datapath
- Parallelism: Pipelining
- Data hazards, Control hazards

Chapter 5: Memory Hierarchy

- Memory, Caches
- Virtual memory

Chapter 6: Parallel Processors

- Parallel processing
- SISD, MIMD, SIMD, SPMD, and vector
- Hardware multithreading
- Multicore and other shared memory multiprocessors

Tentative Schedule

Week Tue	Note	Important topics/readings, assignments, due dates, and reminders are listed here so that you can organize your time and academic work.
1 08/20		ECE 394: Intro to Computer Architecture, Syllabus; K-probe; zyBook 1.1 (Intro to Computers); Homework, Quiz, and Exam;
2 08/27	HW-1	HW-1 Discussion; zyBook 1.2-1.5 (eight ideas, processors); HW-1 (due on Blackboard); zyBook 1.6 (performance);
3 09/03	HW-21);	-

1) *July 24, 2024; prepared for fall 2024 term; DRZ*

Definition of a Credit Hour

Example for 3 credit hour class:

Go to 4.08 / Definition and Assignment of Credit Hours for the policy and examples for different types of courses and credit hour offerings.