

UCCS
Department of Electrical and Computer Engineering

ECE 4480/5480- Computer Architecture and Design
(3 credits)

Syllabus

Spring 2024

Part A - Course Outline

Catalog description:

The design of large digital systems with emphasis on the computer. Architectural alternatives, instruction set design, implementations including microprogramming, and actual examples are discussed. Performance tradeoffs. Prer., ECE 3430. College of Engineering students only. Meets with ECE 5480.

Textbook:

Computer Organization and Design MIPS Edition, 6th Edition or later edition
(Authors: D. Patterson and J. Hennessy), *Morgan Kaufmann* [ISBN: 978-0128201091]

Reference books (optional):

Computer Architecture – A Quantitative Approach, Sixth Edition or later edition
(Authors: J. Hennessy and D. Patterson), *Morgan Kaufmann*
Introduction to Computing Systems – from bits & gates to C & beyond, Second Edition
(Authors: Y. Patt and S. Patel), *McGraw-Hill*
Digital Systems Design Using Verilog, 1st Edition, 2015 (Charles Roth, Lizy K. John, Byeong Kil Lee)

Major prerequisites by topic:

1. Basic logic design
2. State machine
3. Basics of microcomputer system
4. C/C++ programming (on Linux environment)
5. Verilog modeling

Course objectives:

1. To develop skills in computer architecture
2. To understand memory hierarchy, parallel processing, arithmetic, microprogramming
3. To understand fundamentals of microprocessors design.

Topics covered:

- Review of basic digital systems design
- Fundamentals of computer design (pipelining, instruction set principles)
- Instruction-level parallelism and its exploitation
- Limits on instruction-level parallelism
- Multiprocessor and thread-level parallelism
- Memory hierarchy design
- Storage system
- Recent research topics

Course content:

- 60% Engineering Sciences; 40% Engineering Design

Class/laboratory schedule:

- **Class:**
 - 2 – 75 minute lecture session/week
- **Lab:**
 - The course has lab assignments (C/C++ coding and/or Verilog coding)

Contribution of course to meet the professional component:

- This course prepares students to work professionally in the area of microprocessor design.

Part B - Course Details**Instructor:**

- Name: Dr. Byeong Kil Lee
- Office: ENGR 220 (*will move to a new building during the semester*)
- Phone: 719-255-4565
- Office hours: Mon/Wed 3-4pm or by appointment
- E-mail: blee@uccs.edu
- URL: <http://ece.uccs.edu/~blee>

Class:

- Classroom: ENGR136
- Class hours: Mon/Wed 1:40pm – 2:55pm

TA/Grader:

- Name: TBA
- E-mail: TBA

Evaluation methods: (Grade based on distribution)

- | | |
|---|-----|
| • Homework & Lab assignments | 35% |
| • Midterm Exam | 20% |
| • Final Exam | 30% |
| • Term Project | 10% |
| • Attendance, Class Participation, Quiz, etc. | 5% |

Homework and Lab Assignment:

- 4 & 4 (or 5 & 5)
- Lab assignments include C/C++, Python or Verilog programming, simulation, and analysis, etc.

Important Deadlines:

Note that midterm performance (HW, Quiz, Lab, Project and Midterm Exam) will be available by April 5 on Canvas. Use this to decide on continuing or dropping the course.

† The deadline for dropping without ECE Chair/the Dean signature is April 5.

Instructor for the course will not sign any petition to drop after April 5.

Attendance Policy:

- Attendance is required (in-person class). Students are responsible for topics covered in missed classes, as well as any assignments due.

Recording Lectures: (No recording for Spring 2024; it might be changed depending on the COVID 19 status)

- If recorded, portions of this class might be recorded by the instructor for educational purposes. These recordings may be made available to students registered for this class. Students may not reproduce the recording, share the recording, or upload the recording to any online environments. Your instructor will communicate how you can access the recordings. If the instructor or the University plan any other uses for a recording, consistent with FERPA, students identifiable in the recordings will be notified to request consent prior to such use or they will be de-identified.

Military Policy:

- If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact your UCCS Course Instructor no later than the first week of class to discuss the class attendance policy.

Academic Integrity:

- Cheating in any form will be fully prosecuted.
- Academic Honor Code
(http://catalog.uccs.edu/content.php?catoid=7&navoid=277#Acad_Honor_Code)

Quizzes:

- There will be two quizzes during the semester (one week before the mid-term and final exam). No makeups allowed on the quizzes.

In classroom:

- No disruptive activity/talking amongst students in class during lectures. If you have a question on the material, ask the instructor. Be professional in your behavior in class. Disruptive activity can lead to grade penalties.

UCCS Disability Services:

- UCCS provides, upon request, appropriate academic adjustments for qualified students with disabilities. For more information, visit Disability services homepage (<https://www.uccs.edu/disability>) or contact 719.255.3354, dservice@uccs.edu

Links:

- Canvas: <https://canvas.uccs.edu>
- Spring 2024 Academic Calendar: <https://www.uccs.edu/admissionsenrollment/calendar#spring-events>
- UCCS website for **COVID 19**: <https://covid19.uccs.edu/>
- UCCS Health Center : <https://uccs.edu/recwellness/health-services>

Tentative Schedule:

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Tentative Schedule

		Lecture	HW/Lab	Exam
Week1	1/15	No class (MLK day)		
	1/17	Ch0		
Week2	1/22			
	1/24	Ch1		
Week3	1/29			
	1/31		HW#1 due	
Week4	2/5	Ch2		
	2/7		Lab#1 due	
Week5	2/12			
	2/14	Ch4	HW#2 due	
Week6	2/19			
	2/21			
Week7	2/26			
	2/28	Ch5	HW#3 due	
Week8	3/4			
	3/6	Quiz #1	Lab#2 due	
Week9	3/11	Review		
	3/13	Midterm exam		
Week10	3/18			
	3/20			
Week11	3/25	No class (Spring Break)		
	3/27	No class (Spring Break)		
Week12	4/1	Ch3	HW#4 due	
	4/3		Lab#3 due	
Week13	4/8			
	4/10	Ch6		
Week14	4/15			
	4/17			
Week15	4/22		HW#5 due	
	4/24			
Week16	4/29	Quiz #2	Lab#4 due	
	5/1	Review		

Final exam