

The University of Oklahoma
School of Electrical and Computer Engineering

Course: ECE 4613 / CS 4613 Computer Architecture

Instructor: Dr. Ronald Barnes 405.325.1879; ron@ou.edu
Office Hours: 336 Devon Energy Hall
Time: T TH 1:00PM-2:30PM
 and by appointment

TA: TBA
Office Hours: TBA

Grading Policy:

Exams:	50% (15% each Midterms 1 and 2	20% Final)
Homework:	10% (Weekly written homework)	
zyLabs	15% (MIPS programming assignments in zyBook)	
zyBook:	10% (Reading and examples in zyBook online textbook)	
Design Projects:	15%	

Catalog Description: Covers basic concepts of computer system design and communication between components, along with current and historical examples of computer architecture.

Course Objectives: Students will develop and understanding of the fundamentals of computer architecture. Students will appreciate current trends and constraints in this rapidly changing field. Students will implement (both individually and in teams) the basic concepts presented in lecture using industry standard hardware design tools. Students will communicate their design decisions and evaluations in written reports and oral presentations.

Text: Online zyBook Textbook:
David Patterson and John Hennessy, Computer Organization and Design:
The Hardware/Software Interface, 6th Edition, Morgan Kaufmann

1. Click any zyBooks assignment link in Canvas
(Do not go to the zyBooks website and create a new account)
2. Subscribe

This course is an intensive introduction to the fundamentals of computer architecture. We will discuss the basic design, or architecture, of computing hardware. Computer systems involve architecture design at many levels. We will focus on the instruction set architecture (ISA) level (the interface between the software and computing hardware) and the microarchitecture level (the computing hardware itself). We will examine to some extent, the level above the instruction set (the programming language level) and the level below the microarchitecture (the logic gate level) in order to deepen our understanding of computing systems.

Topics:

1. Introduction to Computer Abstractions
2. Instructions: Language of the Computer
3. Computer Arithmetic
4. Representation of Floating Point Values and Floating Point Arithmetic
5. Datapath Design
6. Control Path Design
7. Pipelined Datapath and Control
8. Data Hazards and Forwarding
9. Control Hazards and Prediction
10. Instruction-level Parallelism
11. Cache Memories
12. Virtual Memory
13. Exceptions and interrupts
14. Multiprocessor Architectures

Academic Integrity: Cheating is strictly prohibited at the University of Oklahoma, because it devalues the degree you are working hard to get. As a member of the OU community it is your responsibility to protect your educational investment by knowing and following the rules. For specific definitions on what constitutes cheating, review the Student's Guide to Academic Integrity at <https://www.ou.edu/integrity/students>

To be successful in this class, all work on exams and quizzes must be yours and yours alone. You may not receive outside help. On examinations and quizzes you will never be permitted to use your notes, textbooks, calculators, or any other study aids. Should you see someone else engaging in this behavior, I encourage you to report it to myself or directly to the Office of Academic Integrity Programs. That student is devaluing not only their degree, but yours, too. Be aware that it is my professional obligation to report academic misconduct, which I will not hesitate to do. Sanctions for academic misconduct can include expulsion from the University and an F in this course, so don't cheat. It's simply not worth it.

Integrity Pledge: The following pledge, along with a student signature line, will be placed on quiz and exam sheets:

On my honor, I affirm that I have neither given nor received inappropriate aid in the completion of this exercise.

Land Acknowledgement Statement Provided by OU's Tribal Liaison office:

Long before the University of Oklahoma was established, the land on which the University now resides was the traditional home of the “Hasinai” Caddo Nation and “Kitikiti'sh” Wichita & Affiliated Tribes.

We acknowledge this territory once also served as a hunting ground, trade exchange point, and migration route for the Apache, Comanche, Kiowa and Osage nations. Today, 39 tribal nations dwell in the state of Oklahoma as a result of settler and colonial policies that were designed to assimilate Native people. The University of Oklahoma recognizes the historical connection our university has with its indigenous community. We acknowledge, honor and respect the diverse Indigenous peoples connected to this land. We fully recognize, support and advocate for the sovereign rights of all of Oklahoma's 39 tribal nations. This acknowledgement is aligned with our university's core value of creating a diverse and inclusive community. It is an institutional responsibility to recognize and acknowledge the people, culture and history that make up our entire OU Community.

Positive class climate - It is your instructor's intention to provide a positive class climate that is supportive and in which students feel accepted and valued. All students have the right to be safe to learn in an environment free from negativity and bias. Student behavior that is contrary to a positive class climate will be corrected and may result in the student being removed from the course. In both classroom and online discussions students are expected to treat each other with respect. I welcome students of all race, gender, religion, sexual orientation, gender identity, age, marital status veteran status or disability.

Because I feel strongly about creating welcoming and inclusive learning environments, I continue to learn by attending inclusive teaching workshops for faculty and also Aspiring Ally workshops for folks who want to create welcoming and inclusive classrooms for their LGBTQ+ students. This also means that I am committed to respecting your name and pronoun. If you choose to do so, you can also add your pronoun to your Canvas profile, which will be visible to others as well as me. You may do this by selecting “account”, “profile”, “edit profile”, and then select your pronouns. If you would, at any point, like to update me of any name or pronoun changes please reach out to me. For additional guidance you may wish to visit with the Gender + Equality Center.

Late submission policy: Late homework will not be accepted. However, the lowest **one** homework grade will be dropped in the calculation of your final grade. Late zyLab and project submissions will be penalized 10% per day. They will be accepted no later than **three days** after the due date after which time a reference solution will be provided. Late completion of zyBooks reading and participations assignments will be penalized 50% after the expected completion date but will be accepted up until the date of the next exam. Exceptions due to illness or other extraordinary circumstances should be requested before the class in which the assignment is due.

University Policies

Mental Health Support Services

Support is available for any student experiencing mental health issues that are impacting their academic success. Students can either be seen at the University Counseling Center (UCC) located on the second floor of Goddard Health Center or receive 24/7/365 crisis support from a licensed mental health provider through [TELUS Health](#). To schedule an appointment or receive more information about mental health resources at OU please call the UCC at 405-325-2911 or visit [University Counseling Center](#). The UCC is located at 620 Elm Ave., Room 201, Norman, OK 73019.

Title IX Resources and Reporting Requirement

The University of Oklahoma faculty are committed to creating a safe learning environment for all members of our community, free from gender and sex-based discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking, in accordance with Title IX. There are resources available to those impacted, including: speaking with someone confidentially about your options, medical attention, counseling, reporting, academic support, and safety plans. If you have (or someone you know has) experienced any form of sex or gender-based discrimination or violence and wish to speak with someone confidentially, please contact [OU Advocates](#) (available 24/7 at 405-615-0013) or [University Counseling Center](#) (M-F 8 a.m. to 5 p.m. at 405-325-2911).

Because the University of Oklahoma is committed to the safety of you and other students, and because of our Title IX obligations, I, as well as other faculty, Graduate Assistants, and Teaching Assistants, are mandatory reporters. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This means that we are obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This includes disclosures that occur in: class discussion, writing assignments, discussion boards, emails and during Student/Office Hours. You may also choose to report directly to the Institutional Equity Office. After a report is filed, the Title IX Coordinator will reach out to provide resources, support, and information and the reported information will remain private. For more information regarding the University's Title IX Grievance procedures, reporting, or support measures, please visit [Institutional Equity Office](#) at 405-325-3546.

Reasonable Accommodation Policy

The University of Oklahoma (OU) is committed to the goal of achieving equal educational opportunity and full educational participation for students with disabilities. If you have already established reasonable accommodations with the Accessibility and Disability Resource Center (ADRC), please [submit your semester accommodation request through the ADRC](#) as soon as

possible and contact me privately, so that we have adequate time to arrange your approved academic accommodations.

If you have not yet established services through ADRC, but have a documented disability and require accommodations, please complete [ADRC's pre-registration form](#) to begin the registration process. ADRC facilitates the interactive process that establishes reasonable accommodations for students at OU. For more information on ADRC registration procedures, please review their [Register with the ADRC](#) web page. You may also contact them at (405)325-3852 or adrc@ou.edu, or visit www.ou.edu/adrc for more information.

Note: disabilities may include, but are not limited to, mental health, chronic health, physical, vision, hearing, learning and attention disabilities, pregnancy-related. ADRC can also support students experiencing temporary medical conditions.

Religious Observance

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty. [\[See Faculty Handbook 3.15.2\]](#)

Adjustments for Pregnancy/Childbirth Related Issues

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact the Accessibility and Disability Resource Center at 405/325-3852 and/or the Institutional Equity Office at 405/325-3546 as soon as possible. Also, see the Institutional Equity Office [FAQ on Pregnant and Parenting Students' Rights](#) for answers to commonly asked questions.

Final Exam Preparation Period

Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to OU's [Final Exam Preparation Period policy](#).

Emergency Protocol

During an emergency, there are official university [procedures](#) that will maximize your safety.

Severe Weather: If you receive an OU Alert to seek refuge or hear a tornado siren that signals severe weather.

1. Look for severe weather refuge location maps located inside most OU buildings near the entrances.
2. Seek refuge inside a building. Do not leave one building to seek shelter in another building that you deem safer. If outside, get into the nearest building.
3. Go to the building's severe weather refuge location. If you do not know where that is, go to the lowest level possible and seek refuge in an innermost room. Avoid outside doors and windows.
4. Get in, Get Down, Cover Up
5. Wait for official notice to resume normal activities.

Additional [Weather Safety Information](#) is available through the Department of Campus Safety.

The University of Oklahoma Active Threat Guidance

The University of Oklahoma embraces a Run, Hide, Fight strategy for active threats on campus. This strategy is well known, widely accepted, and proven to save lives. To receive emergency campus alerts, be sure to update your contact information and preferences in the account settings section at one.ou.edu.

RUN: Running away from the threat is usually the best option. If it is safe to run, run as far away from the threat as possible. Call 911 when you are in a safe location and let them know from which OU campus you're calling from and location of active threat.

HIDE: If running is not practical, the next best option is to hide. Lock and barricade all doors; turn off all lights; turn down your phone's volume; search for improvised weapons; hide behind solid objects and walls; and hide yourself completely and stay quiet. Remain in place until law enforcement arrives. Be patient and remain hidden.

FIGHT: If you are unable to run or hide, the last best option is to fight. Have one or more improvised weapons with you and be prepared to attack. Attack them when they are least expecting it and hit them where it hurts most: the face (specifically eyes, nose, and ears), the throat, the diaphragm (solar plexus), and the groin.

Please save OUPD's contact information in your phone (given on next page)

NORMAN campus: *For non-emergencies call (405) 325-1717. For emergencies call (405) 325-1911 or dial 911.*

TULSA campus: *For non-emergencies call (918) 660-3900. For emergencies call (918) 660-3333 or dial 911.*

Fire Alarm/General Emergency

If you receive an OU Alert that there is danger inside or near the building, or the fire alarm inside the building activates:

1. *LEAVE* the building. Do not use the elevators.
2. *KNOW* at least two building exits
3. *ASSIST* those that may need help
4. *PROCEED* to the emergency assembly area
5. *ONCE* safely outside, *NOTIFY* first responders of anyone that may still be inside building due to mobility issues.
6. *WAIT* for official notice before attempting to re-enter the building.

[OU Fire Safety on Campus](#)