

The University of Oklahoma
School of Electrical and Computer Engineering

Course: ECE 5463/CS 5463 Advanced Computer Architecture
In-person format meeting in CEC 121 T & Th 4:30-5:45

Instructor: Dr. Ronald Barnes ron@ou.edu ; 405-325-1879;
Office Hours: 336 Devon Energy Hall
M F 10:00AM-11:00 AM / T TH 1:00PM-2:30PM
and by appointment

Course Prerequisite: ECE 4613/CS4613 Computer Architecture (or equivalent)

This course will focus on the design of modern, programmable computer systems with an emphasis on exploiting parallelism at the instruction, data, memory, thread and processor levels. The impact this available parallelism (especially multi-core processors) has on software design will also be discussed. The state of the art in computer architecture and its future trends will be examined with case studies of current and proposed microprocessor architectures. Topics will include a detailed look at datapath pipelining/superpipelining, improving memory throughput, instruction-level parallelism, dynamic instruction scheduling, branch prediction, data parallelism, general-purpose computing on graphics processing units, thread-level parallelism, multi-core processors and multiprocessor systems.

Required Textbook: No textbook is required. Regular readings will be posted to Canvas.

Grading Policy:

Midterm: 35%	Final: 35%
Simulations: 15%	Homework: 15%

Assignments: Regular readings will be posted to Canvas each Tuesday and will be expected to have been read by the following Tuesday. Supplemental readings may also be provided. These may help deepen your understanding of the topic but are not required. Written homework will be assigned most weeks and will be submitted via Canvas. Simulation homework will also be assigned frequently to provide experience using tools and methods on computer architecture research. All assignments will be completed individually unless otherwise stated. A midterm exam will be held during the class period of Thursday March 14, 2024 (subject to modification as needed due to course mechanics). Our final exam will be held in our regular classroom on Friday May 10, 2022 from 10:30AM-12:30PM as prescribed by the University.

Late submission policy: Homework will be assigned on most Tuesdays and due on the following Tuesday. All assignments (homework and simulations) will be given an automatic two-day extension, without penalty) to Thursday. Late homework and simulation submissions will not be accepted after this extended due date. Exceptions due to illness or other extraordinary circumstances should be requested (when at all possible) *before* the class in which the assignment is due. Make-up exams must be requested before the day of the exam except in case of sudden illness or other unavoidable circumstances.

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.

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

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

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 http://integrity.ou.edu/students_guide.html

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, 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.

Teaching Philosophy and Inclusion: My goal is to create a class in which everyone is welcome, included, and able to learn and succeed. Please talk to me if there is something I need to know in order to facilitate a positive and productive learning experience for you.

A considerable portion of this class will be spent discussing the course readings and exploring different ideas and perspectives. My intention is to foster discussion during class. This means that, in part, all students are responsible for contributing to both their own learning experience and the learning experience of others. You are expected to complete the readings on time and be prepared to address the discussion questions in class. Because the contribution of ideas from each student is critical to the learning process, any behavior that makes other students feel uncomfortable will not be tolerated. This includes interrupting others while they are talking, carrying on conversations separate from the class discussion, or making comments that could be perceived by others as offensive in terms of race, gender, sexual orientation, religion, ethnicity, nationality, or disability. Please make every effort to maintain an atmosphere where everyone feels comfortable sharing and responding to ideas. This extends beyond the classroom to course work outside of class and to Canvas and other electronic forums.

University Policies:

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.

Reasonable Accommodation Policy: The Accessibility and Disability Resource Center is committed to supporting students with disabilities to ensure that they are able to enjoy equal access to all components of their education. This includes your academics, housing, and community events. If you are experiencing a disability, a mental/medical health condition that has a significant impact on one or more life functions, you can receive accommodations to

provide equal access. Possible disabilities include, but are not limited to, learning disabilities, AD(H)D, mental health, and chronic health. Additionally, we support students with temporary medical conditions (broken wrist, shoulder surgery, etc.) and pregnancy. To discuss potential accommodations, please contact the ADRC at 730 College Avenue, (ph.) 405.325.3852, or adrc@ou.edu.

Title IX Resources and Reporting Requirement: For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, the University offers a variety of resources. To learn more or to report an incident, please contact the Sexual Misconduct Office at 405/325-2215 (8 to 5, M-F) or smo@ou.edu. Incidents can also be reported confidentially to OU Advocates at 405/615-0013 (phones are answered 24 hours a day, 7 days a week). Also, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. Inquiries regarding non-discrimination policies can be directed to University Equal Opportunity Officer and Title IX Coordinator at 405/325-3546 or smo@ou.edu. For more information, visit <http://www.ou.edu/eoo.html>.

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 your professor or the Disability Resource Center at 405/325-3852 as soon as possible. Also, see <http://www.ou.edu/eoo/faqs/pregnancy-faqs.html> 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 (<https://apps.hr.ou.edu/FacultyHandbook#4.10>).

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.

Armed Subject/Campus Intruder: If you receive an OU Alert to shelter-in-place due to an active shooter or armed intruder situation or you hear what you perceive to be gunshots:

1. GET OUT: If you believe you can get out of the area WITHOUT encountering the armed individual, move quickly towards the nearest building exit, move away from the building, and call 911. 2. HIDE OUT: If you cannot flee, move to an area that can be locked or barricaded, turn

off lights, silence devices, spread out, and formulate a plan of attack if the shooter enters the room. 3. TAKE OUT: As a last resort fight to defend yourself.

For more information, visit <http://www.ou.edu/emergencypreparedness.html>

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.

Mental Health Support Services: If you are experiencing any mental health issues that are impacting your academic performance, counseling is available at the University Counseling Center (UCC). The Center is located on the second floor of the Goddard Health Center, at 620 Elm Rm. 201, Norman, OK 73019. To schedule an appointment call (405) 325-2911.