

ECE4100 / ECE6100 / CS4290 / CS6290
Advanced Computer Architecture
Course Syllabus

Course Information

Instructor: Prof. Cong (Callie) Hao

Institution: Georgia Institute of Technology

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Textbook: *Computer Architecture: A Quantitative Approach, Hennessy & Patterson (5th Ed.)* – Recommended

Semester: Fall 2026

Module 1: Processors

Lecture	Topic
L1	Introduction
L2	Past and Present
L3	Single ISA Implementation
L4	Pipelining & Hazards
L5	Branch Prediction
L6	Branch Prediction & Superscalar
L7	Out-of-Order Execution I
L8	Out-of-Order Execution II
L9	Out-of-Order Execution III
L10	Out-of-Order Execution IV
L11	Multithreading
L12	VLIW
L13	Vector Machines / GPUs

Module 2: Memory Systems

Lecture	Topic
L14	Cache Basics

Lecture	Topic
L15	Cache Optimization
L16	Virtual Memory I
L17	Virtual Memory II
L18	DRAM

Module 3: Multiprocessors & Interconnects

Lecture	Topic
L19	Multiprocessor
L20	Network-on-Chip I
L21	Network-on-Chip II
L22	Cache Coherence I
L23	Cache Coherence II
L24	Cache Coherence III
L25	Memory Consistency

Module 4: Modern Techniques

Lecture	Topic
L26	Software-Hardware Co-Design
L27	FPGAs & Domain-Specific Accelerators

Grading

Labs (35%)

Lab 1: 5%

Lab 2: 10%

Lab 3: 10%

Lab 4: 10%

Homework (4%)

HW1: 2%

HW2: 2%

Exams (60%)

Midterm I: 20%

Midterm II: 20%

Final: 20%

Participation (1%)

Evaluated using Piazza statistics

Prerequisites

ECE 3056 or equivalent. Students should have foundational knowledge in:

- Digital Logic (FSMs, combinational/sequential logic, muxes, decoders)
- 5-Stage Processor Pipeline (RAW, WAR, WAW hazards)
- Caches (direct-mapped, set-associative, fully-associative)

Course Policies

Academic Integrity: All lab assignments are individual work. Discussion of ideas is permitted, but sharing or viewing code is prohibited. MOSS is used to detect plagiarism. Violations result in zero on the assignment, one grade drop, and a report to the Dean.

Late Policy: 24 hours late: -10%. 48 hours late: -20%. Beyond 48 hours: not accepted.

Exams: No make-up exams. Emergency situations handled case-by-case with documentation.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review [Georgia Tech's Honor Code](#) and the student [Code of Conduct](#).

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.