Department of Electrical and Computer Engineering
The University of Texas at Austin

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Course Outline ECE460N
August 24, 2026

August 24: Lecture 1, Chapter 1, Intro to the course: Levels of Transformation. Basic architectural choices. Science of Tradeoffs. Multiplication: a series of shifts and adds.

August 26: Lecture 2, Chapter 1, Intro to the course (continued).

August 27: 4th class day, last day to add a class without permission.

August 27,28: First Discussion Session. Bookkeeping, overview, expectations, Programming Lab 0 (PL0), Intro/Focus.

August 31: Lecture 3, Chapter 2, Intro to Instruction Set Architecture with examples taken from many diverse ISAs: ISA tradeoffs. Detailed discussion of LC-3b, with Assembly language constructs.

September 2: Lecture 4, Chapter 3, Basic microarchitecture: LC-3b data path, state machine, microsequencer, two-level microprogramming, Wilkes' Diode Matrix, Choice of ASICs, FPGAS, EMT instruction for enhanced performance. Pipelining.

September 3,4: Discussion Session. The ISA, Assembly Process, PL1.

September 7: Labor Day, no class.

Problem set 1 due before class, September 9. (Emphasis: Chapters 1 and 2)

September 9: Lecture 5, Chapter 3, Basic microarchitecture (continued).

September 9: 12th class day, last day to drop a class without permission.

Programming Lab 0 is due Wednesday night, September 9, 11:59pm. (The program itself will be empty. The purpose of the assignment is to make sure we are on the same page re: using the system.)

September 10,11: Discussion Session. Basic microarchitecture, PL1.

Programming Lab 1 is due Sunday night, September 13, 11:59pm. (Write a program in LC-3b Assembly Language. Write an Assembler. Assemble the program you have written.)

September 14: Lecture 6, Chapter 4, Microarchitectural enhancements: Microarchitecture Tradeoffs, Enhancing Performance. Out of order Execution, the Tomasulo Algorithm. Branch Prediction, other mechanisms for handling conditional branches. The HEP.

September 16: Lecture 7, Chapter 4, Microarchitectural enhancements (continued).

September 17,18: Discussion Session. Microarchitecture, PL2

Programming Lab 2 is due Sunday night, September 20, 11:59pm. (Write a program in C that simulates at the instruction cycle level the baseline LC-3b ISA. Test your simulator with the output of the assembler for the application program written in Programming Lab 1.)

September 21: No class.

September 23: Lecture 8, Chapter 5, Operating system topics: The notion of Process, the unit of work managed by the Operating System, and its implications on Interrupts/Exceptions and on Virtual memory.

September 24,25: Discussion Session. Operating system topics, PL3.

Problem set 2 due before class, September 28. (Emphasis: Chapter 4)

September 28: Lecture 9, Chapter 6, Physical Memory: SRAM, DRAM, NVM. Interleaving, Unaligned accesses.

September 30: Lecture 10, Chapter 6, Physical Memory (continued).

October 1,2: Discussion Session. Physical memory, prepare for the first midterm.

Problem set 3 due before class, October 5. (Emphasis: Chapters 5 and 6)

October 5: Lecture 11, Review for the first midterm.

October 7: Lecture 12, Exam 1.

October 8,9: Discussion Session. Go over the first midterm.

Programming Lab 3 is due Sunday night October 11, 11:59pm. (Finish the clock-cycle-level Simulator for the LC-3b. Test it on the application program written in Programming Lab 1.)

October 12: Lecture 13, Chapter 7, Virtual Memory: Page tables, TLB, VAX model, IA32 model, Translation and Protection, contrast with segmentation. One level and two level page tables, the PTE, TLB, IA32 model, VAX model.

October 14: Lecture 14, Chapter 7, Virtual Memory (continued).

October 15,16: Discussion Session. Virtual memory.

October 19: Lecture 15, Chapter 7, Virtual Memory (continued).

October 21: Lecture 16, Chapter 8, Cache Memory: Tag store, data store, sets, ways, write through, write back.

October 22,23: Discussion Session. Virtual memory, caches, PL4.

Problem set 4 due before class, October 26. (Emphasis: Chapter 7)

October 26: Lecture 17, Chapter 8, Cache Memory (continued).

October 28: Lecture 18, Chapter 9, Input/Output: Asynchronous/Synchronous, Arbitration, Transaction.

October 29,30: Discussion session. Caches, I/O, PL5.

> **Programming Lab 4** is due Sunday night, November 1, 11:59pm. (Add state, data path, and microsequencer to handle interrupts and exceptions)

November 2: Lecture 19, Chapter 10, Fixed point arithmetic: 2's complement, 1's complement, signed magnitude, addition, multiplication.

November 4: Lecture 20, Chapter 11, Floating point arithmetic: Instruction formats, Gradual underflow, Rounding modes, NaNs, Floating Point Exceptions.

November 5,6: Discussion session. Prepare for the second midterm.

> **Problem set 5** due before class, November 9. (Emphasis: Chapters 8 and 9)

November 9: Lecture 21, Review for the second midterm.

November 11: Lecture 22, Exam 2.

November 12,13: Discussion Session: Go over second midterm.

November 16: Lecture 23, Chapter 12, Single-thread parallelism: SIMD, Vectors, VLIW vs Wide Issue, DAE, HPS, Data Flow.

November 18: Lecture 24, Chapter 12, Single-thread parallelism (continued).

November 18: Last day an undergraduate can Q-drop , withdraw, change to pass/fail

November 19,20: Discussion Session. Single-thread parallelism, PL5.

> **Programming Lab 5** is due before you leave for Thanksgiving break. (Add state, data path, and microsequencer to handle Virtual memory)

November 23: Last day a graduate student can change to credit/no-credit.

November 23-28: No class, Thanksgiving break.

November 30: Lecture 25, Chapter 13, Intro to Multiprocessing: Amdahl's Law, Speed-up, efficiency, Interconnection networks, Heterogeneous vs Homogenous, CMP vs SMT, Cache Coherency, Memory Consistency.

> **Problem set 6** due before class,December 2. (Emphasis: Chapters 10 and 11)

December 2: Lecture 26, Chapter 13, Multiprocessing (continued).

December 3,4: Discussion session. Multiprocessing, prepare for Final exam, PL6.

December 7: Lecture 27, last class, free for all!

> **Programming Lab 6** is due Monday evening, December 7, 5pm. (Pipelined implementation of the LC-3b)

December 8-9: Study days.

Final exam: December 11, 7-9 PM

Please note: The Registrar has the right to change the dates of the final exams. Please keep checking the Registrar's web site and our announcements to be sure when the final exam will actually be given.