

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

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Course Outline ECE460N, ECE382N.1

August 26, 2026

August 26: Lecture 1: Intro to the course. Levels of Transformations. Basic architectural choices. Science of Tradeoffs.

August 28: Lecture 2: Intro/focus, continued. Tradeoffs, Latency and Bandwidth, Role of Parallelism, Role of Speculation, Overview of Quantitative Insights, Role of the Architect, Alternative Design Points.

August 29: 4th class day, last day to add a class without permission.

August 29,30: First Discussion Session. Bookkeeping, overview, expectations, PL0, Intro/Focus

Programming Lab 0 is due, Sunday night, September 1, 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 2: Labor Day, no class.

September 4: Lecture 3: Intro to Instruction Set Architecture, with examples taken from many diverse ISAs. ISA tradeoffs. Detailed discussion of LC-3b, with Assembly language constructs. The Assembler, how it works.

September 5,6: Discussion Session. The ISA, Assembly Process, PL1.

September 9: Lecture 4: The ISA (continued)

September 11: 12th class day, last day to drop a class without permission.

September 11: Lecture 5: Microarchitecture, LC-3b data path, state machine, microsequencer, two-level microprogramming, Wilkes' Diode Matrix, Choice of ASICs, FPGAs, EMT instruction for enhanced performance

September 12,13: Discussion Session. Microarchitecture, PL1.

Programming Lab 1 is due, Sunday night, September 15, 11:59pm. (Write a program in LC-3b Assembly Language. Write an Assembler. Assemble the program you have written.)

September 16: Lecture 6: Microarchitecture, continued. Microarchitecture Tradeoffs, Enhancing Performance. Pipelining, and its implications. Scoreboarding and its limitations.

Problem set 1 due before class, September 18. (Emphasis: ISA, microarchitecture basics, the Assembly Process)

September 18: Lecture 7: Microarchitecture Enhancements. (Out of order Execution, the Tomasulo Algorithm)

September 19,20: Discussion Session. Microarchitecture, PL2

Programming Lab 2 is due Sunday night, September 22, 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 23: Lecture 8 Microarchitecture Enhancements, continued. Branch Prediction, other mechanisms for handling conditional branches. The HEP.

September 25: Lecture 9: The notion of Process, the unit of work managed by the Operating System, and its implications on Interrupts/Exceptions and on Virtual memory.

September 26,27: Discussion Session. (Emphasis on Arithmetic), PL3

September 30: Lecture 10: Physical Memory. SRAM, DRAM, NVM. Interleaving, Unaligned accesses.

October 2: Lecture 11: Physical Memory, continued.

October 3,4: Discussion Session. Process, Prepare for first midterm.

Problem set 2 due before class, October 7. (Emphasis: out-of-order execution, branch prediction, process, physical memory), I/O, Process)

October 7: Lecture 12: Review or Catch up!

October 9: Lecture 13: Exam 1

October 10,11: Discussion Session. Go over first exam, PL4

Programming Lab 3 is due, Sunday night October 13, 11:59pm. (Finish the clock-cycle-level Simulator for the LC-3b. Test it on the application program written in Programming Lab 1.)

October 14: Lecture 14: Virtual memory, page tables, TLB, VAX model, IA32 model, Translation and Protection, contrast with segmentation.

October 16: Lecture 15: Virtual memory, continued.

October 17,18: Discussion Session. (Emphasis on Physical Mem, Virtual Mem, PL4

October 21: Lecture 16: Virtual Memory, continued.

October 23: Lecture 17: Cache memory

October 24,25: Discussion session: Virtual Memory, Cache Mem, PL5

Problem set 3 due before class, October 28. (Emphasis on Physical Memory, Virtual Memory.)

October 28: Last day an undergraduate can Q-drop , withdraw, change to pass/fail

October 28: Lecture 18: Cache memory, continued.

October 30: Lecture 19: Integer Arithmetic

October 31, November 1: Discussion session: Cache, Pipelining, Scoreboard, Tomasulo, PL5

Programming Lab 4 is due Sunday night, November 3, 11:59pm. (Add state, data path, and microsequencer to handle interrupts and exceptions)

November 4: Lecture 20: Floating point arithmetic and the IEEE Standard. Instruction formats, Gradual underflow, Rounding modes, NaNs, Floating Point Exceptions.

November 6: Lecture 21: Input/Output. Asynchronous/Synchronous, Arbitration, Transaction.

November 7,8: Discussion Session: Prepare for second midterm Exam

Problem set 4 due before class, November 11. (Emphasis on Cache, Integer arithmetic, floating point arithmetic)

November 11: Lecture 22: Review or Catch up.

November 13: Lecture 23: Exam 2.

November 14,15: Discussion Section: Go over second midterm.

Programming Lab 5 is due Sunday night, November 17, 11:59pm. (Add state, data path, and microsequencer to handle Virtual memory)

November 18: Lecture 24: Single-thread performance SIMD, Vectors, VLIW vs Wide Issue, DAE,

November 20: Lecture 25: Single-thread parallelism, continued. (HPS, Data Flow).

November 21,22: Discussion Session:

November 25: Last day a graduate student can change to credit/no-credit.

November 25-29: No class, Thanksgiving break.

December 2: Lecture 26: Intro to Multiprocessing, Amdahl's Law, Speed-up, efficiency, Interconnection networks, Cache Coherency, Memory Consistency.

December 4: Lecture 27: Multiprocessing, continued.

December 5,6: Discussion session. PL6, multiprocessing, Review of the course, Prepare for Final exam.

Programming Lab 6 is due Monday afternoon, December 9, 5pm. (Pipelined implementation of the LC-3b)

December 9: Lecture 28: Last class, free for all!

Problem set 5. To be used as a study guide for the final exam, not to be turned in.

December 10-11: Study days.

December 12-14,16: Final exams.

Final exam: Probably Friday, December 13, 7-10pm.

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 be given.