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

EE 460N/EE 382N.1, Spring, 2017
Yale N. Patt, Instructor
TAs: Chirag Sakhuja, Sarbartha Banerjee, Jonathan Dahm, Arjun Teh

January 18: Lecture 1: Intro to the course. Levels of Transformations. Basic architectural choices. Science of tradeoffs.

January 19, 20: First discussion session: Bookkeeping. Overview. Expectations. PL0.

> Programming Lab 0 due, Sunday night, January 22, 11:59pm. (The program itself will be empty. The purpose of the assignment is to make sure we are on the same page using the system.)

January 23: Lecture 2: 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. PL1.

January 25: Lecture 3: Microarchitecture. LC-3b data path. State machine. Microsequencer.

January 26, 27: Discussion session: ISA. Microarchitecture. PL1.

> Problem Set 1 due before class, January 30. (Emphasis: ISA, uarch of the LC-3b, the Assembly Process.)

January 30: Lecture 4: Microarchitecture. LC-3b data path, continued.

February 1: Lecture 5: Pipelining, Branch Prediction (The HEP).

February 2, 3: Discussion session: Microarchitecture. Pipelining. Branch prediction. PL1.

> Programming Lab 1 due, Sunday night, February 5, 11:59pm. (Write a program in LC-3b Assembly Language. Write an Assembler. Assemble the program you have written.)

February 6: Lecture 6: Physical Memory. Unaligned access. Interleaving. SRAM. DRAM.

February 8: Lecture 7: Physical Memory (continued).

February 9, 10: Discussion session: Physical Memory, PL2

> Problem Set 2 due before class, February 13. (Emphasis: uarch of the LC-3b, the Assembly Process, Physical Memory.)

February 13: Lecture 8: Virtual Memory. Page tables. TLB. VAX model. IA32 model. Contrast with segmentation.

February 15: Lecture 9: Virtual Memory, continued.

February 16, 17: Discussion session: Emphasis on Virtual Memory. PL2.

Programming Lab 2 due, Sunday night, February 19, 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.)

February 20: Lecture 10: Cache Memory.

February 22: Lecture 11: Cache Memory, continued.

February 23, 24: Discussion session: Cache Memory. Review for exam.

Problem Set 3 due before class, February 27. (Emphasis: uarch of the LC-3b, the Assembly Process, Physical Memory, Virtual Memory, Cache Memory, preparation for Midterm exam I.)

February 27: Lecture 12: Review or catch up!

March 1: Lecture 13: Exam 1.

March 2, 3: Discussion session: Discuss the exam.

March 6: Lecture 14: The notion of Process, the unit of work managed by the Operating System, and its implications on Interrupts and Exceptions and Virtual Memory.

March 8: Lecture 15: Input/Output.

March 9, 10: Discussion session: Notion of Process. I/O. Interrupts/Exceptions.

March 13-18: No class, Spring Break.

Programming Lab 3 due, Sunday night, March 19, 11:59pm. (Finish the clock cycle level Simulator for the LC-3b. Test it on the application program written in Programming Lab 1.)

March 20: Lecture 16: Input/Output, continued.

March 22: Lecture 17: Integer Arithmetic

March 23, 24: Discussion session: I/O. PL4.

March 27: Lecture 18: Floating point arithmetic and the IEEE Standard.

March 29: Lecture 19: Single-thread parallelism (SIMD, VLIW, Vectors).

March 30, 31: Discussion session: Arithmetic, PL4.

Problem Set 4 due before class, April 3. (Emphasis: Cache memory, arithmetic.)

April 3: Lecture 20: Single-thread parallelism (Tomasulo, HPS, Data Flow).

Note: April 3 is the last date to Q-drop.

April 5: Lecture 21: Single-thread parallelism, continued.

April 6, 7: Discussion session: Single thread parallelism. PL4.

Programming Lab 4 due, Sunday night, April 9, 11:59pm. (Interrupts/Exceptions.)

April 10: Lecture 22: Intro to Multiprocessing. Amdahl's Law. Speed-up. Efficiency.

April 12: Lecture 23: Interconnection networks. Cache Coherency. Sequential Consistency.

April 13, 14: Discussion session: Multiprocessors. Prepare for second midterm.

Problem Set 5 due before class, April 17. (Emphasis: Multiprocessing.)

April 17: Lecture 24: Review or catch up.

April 19: Lecture 25: Exam 2.

April 20, 21: Discussion session: Go over exam. PL5.

April 24: Lecture 26: Pot Pourri (Measurement methodology, GPUs, Maxeler, etc.)

April 26: Lecture 27: Systems Issues (BW, SMT, Power, Accelerators.)

April 27, 28: Discussion session. PL5 and PL6.

Programming Lab 5 due, Sunday night, April 30, 11:59pm. (Virtual memory.)

May 1: Lecture 28: Ideas for Research

May 3: Lecture 29: Last class, free for all!

May 4, 5: Discussion session: Review of the course. Prepare for Final Exam. PL6.

Programming Lab 6 is due, Friday afternoon, May 5, 5pm. (Pipelining.)
Problem Set 6. A study guide, not to be turned in.

Final exam: Probably Friday, May 12, 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/where the final exam will be given.