January 13 (Lecture 1): **First class meeting.** Intro to the course, administrative details, focus of the course: Principles, Tradeoffs, and Implementation. Levels of transformation, instruction supply, data supply, processing.


January 16: Discussion section, Intro to the CAD tools we will be using in the course.

January 20: Martin Luther King, Jr. Day. No classes scheduled.

January 22 (Lecture 3): The x86 ISA in the context of ISA tradeoffs. Some implementation issues. **Note: Problem set 1a is due at the beginning of this class.**

January 23: Discussion session: Review the use of CAD tools on the logic design of a simple ALU.

January 27 (Lecture 4): ISA/uarch tradeoffs.

January 29 (Lecture 5): Evolution of the Uniprocessor, including SIMD, VLIW, DAE, HPS, Data Flow. The basic superscalar, out-of-order execution model. Effective use of long pipelines without blocking. The structure of a modern pipeline. Functions at each stage. **Note: Problem set 1b is due at the beginning of this class.**

January 30: Discussion session.

February 3 (Lecture 6): Evolution of the uniprocessor, continued.

February 5 (Lecture 7): Run-time optimizations. Trace Cache, Runahead, etc.

February 6: Discussion session.

February 10 (Lecture 8): Multithreading -- HEP, SMT, SSMT.

February 12 (Lecture 9): Branch Prediction **Note: Problem set 2 is due at the beginning of this class.**

February 13: Discussion session.

February 17 (Lecture 10): Compile time optimizations. The Block-structured ISA, Predication, leading to wish branches, Braids, etc. Preview to the future: multiple levels of cache, fast track/slow track.

February 19 (Lecture 11): Compile time optimizations, continued.
Note: Problem set 4 is due at the beginning of this class.

February 20: Discussion session.

February 24 (Lecture 12): Integer Arithmetic.

February 26 (Lecture 13): Floating Point Arithmetic.

February 27: Discussion session, Prepare for written exam.

February 26, 27, 28: Initial Design Reviews with each Project Team.

March 3 (Lecture 14): Review or catch up.

March 5 (Lecture 15): **Written exam, in class.**

March 6: No discussion session: Enjoy Spring break!

March 10-16: Spring break, no classes.

March 17 (Lecture 16): Intro to Multiprocessing.

March 19 (Lecture 17): Cache Coherency.

March 20: Discussion session.

March 24 (Lecture 18): Memory consistency.

March 26 (Lecture 19): Measurement methodology and abuses.

March 27: Discussion session.

March 31 (Lecture 20): RISC: A retrospective.

April 2 (Lecture 21): Case studies: Microarchitectures of existing chips.

April 3: Discussion session, as needed.

April 3,4: **Oral exams (exam2) in 541ENS.**

April 7 (Lecture 22): Case studies (continued).

April 9 (Lecture 23): Case studies (continued).

April 10: Discussion session, as needed.

April 14 (Lecture 24): Current specific issues in Microarchitecture

April 16 (Lecture 25): Current specific issues in Microarchitecture (continued)

April 17: Discussion session, as needed.

April 21 (Lecture 26): Multi-core, Mega-Nonsense.
April 23 (Lecture 27): My sense as to the critical requirements for the future.

April 24: Discussion session, as needed.

April 28 (Lecture 28): Guest lecture from local industry (to be determined).

April 30 (Lecture 29): Last class meeting. Review of the course.

May 1: Discussion session, as needed.

**Final project design reviews in 541a ENS, May 1,2, by appointment.**
**May 9: Final project report due in 541a, 10pm.**

Note: There will be no final exam in this course.