January 14: **First class meeting.** Introduction to the course, administrative details. Focus of the course: Principles and Tradeoffs. Levels of transformation, Instruction supply, data supply, processing.

January 15: **First discussion session.** Orientation. Introduction to the CAD tools we will be using in the course.


January 17, 18: Extra discussion sessions, for those who feel the need it.

January 21: No class, Martin Luther King Day

January 22: Discussion session. Review of the use of the CAD tools on the logic design of a simple ALU.

  Problem Set 1a due at the start of discussion session.

January 23: The x86 ISA in the context of ISA tradeoffs. Some implementation issues.

January 24, 25: Extra discussion sessions, for those who feel they need it.

January 28: ISA tradeoffs, continued.

January 29: Discussion session. CAD tools, continued.

  Problem Set 1b due at the start of discussion session.

January 30: 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.

February 4: Run-time optimizations: Trace Cache, Runahead, etc.

February 5: Discussion session

February 6: 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 11: Simultaneous Multithreading and SSMT.

  Problem Set 2 due at the start of class.

February 12: Discussion session.
February 13: Guest lecture: Professor Mateo Valero Cortes

February 18: Discussion session.
February 19: Discussion session.
February 20: Discussion session.

February 25: Branch Prediction.

Problem Set 4 due at the start of class.

February 26: Discussion session.

February 27: Branch Prediction, continued. Indirect Jumps, Perceptron Predictors, O-GEHL.

March 3,4,5: Individual group meetings to define group implementations.

**March 6,7: First Design Review in 541a ENS, by appointment.**

March 10 through 14: Spring break, no class.

March 17: The off-chip memory bottleneck.

March 18: Discussion session, as needed.

March 19: Review, or catch up, as needed.

March 24: **Written exam, in class.**

March 25: Discussion session, as needed.

March 26: Measurement methodology and abuses.

March 31: RISC, a Retrospective.

April 1: Discussion session, as needed.

April 2: Multiple processor issues, interconnect, steering, memory consistency, transactional memory.

April 7: Multiple processors: Cache Coherency.

April 8: Discussion session, as needed.

April 9: Alternative approaches to Concurrency

April 14: Alternative approaches to Concurrency, continued.

April 15: Discussion session, as needed.

April 16: Case Studies: Pentium M, Niagara, Cell, Power 6, GPGPUs.

April 17,18: Additional design reviews, as needed.

April 21: Case Studies (continued).
April 22: Discussion session, as needed.

April 23: Guest lecture from local industry (to be determined).

**Oral exams (Exam 2) will be given in 541a ENS on April 24,25.**

April 28: Microarchitecture of the microprocessor of the year 2016.

April 29: Discussion session, as needed.

April 30: Last class meeting. Review of the course.

**Final project design reviews in 541a, May 1,2 by appointment.**

May 9: Final project report due in 541a, 10pm.

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