

EN164 Design of Computing Systems, Spring 2012

Instructor: Professor Sherief Reda (sherief_reda@brown.edu)

Class meeting times: TuTh 10:30 pm to 11:50 pm at B & H 165

Office hours: Monday and Thursday from 2:00 pm – 3:00 pm at B & H 349

TAs:

- Nowroz Abdullah (abdullah_nowroz@brown.edu),
- Kumud Nepal (kumud_nepal@brown.edu)

TA lab hours at B & H 194 (lab): All weekdays from 3:00 pm – 4:30 pm

Prerequisites: EN163 or CS 31 or equivalent. Student must pass digital logic quiz with a grade higher than 75 out of 100 to continue enrollment in the class.

Class Topics (30 lectures):

- Introduction
 - Class logistics and overview
 - Computer design objectives, history, and trends
 - Basic computing concepts
- Lab Foundations
 - Programmable logic
 - CAD Tools
 - Verilog
- Processor Design
 - RISC ISA
 - ISA and assembly language
 - Single cycle processors
 - Pipelining
 - Pipelining hazards and mitigation
 - ILP (out of order execution and VLIW)
 - Vector (SIMD machines)
 - x86 family
- Memory hierarchy design
 - Cache memory
 - Virtual Memory
 - DRAM and Flash
- Misc:
 - I/O
 - Intercommunication
 - Multi-core and multi-processor computing

Books

Computer Organization and Design by D. Patterson and J. Hennessy, *revised* 4th edition.

Grading:

- Final 30%
- Lab 30%
- HW 20%
- Midterm 15%
- Two quizzes 5%

Laboratory guidelines: The ultimate objective of the laboratory assignments is to design a fully working pipelined RISC processor. Two students are allowed per lab assignment. Labs must be demoed and lab reports must be submitted to TAs by the due date, which will always be on Fridays. ***All lab assignments must be completed to pass the course.*** Lab assignments lose 15% of the grade for every late submission day.

Homeworks: Homeworks should be handed at the beginning of the class on the due date, which will always be on Tuesdays. Late HWs submitted before the posting of solutions get a penalty of 50%. Late HWs submitted after the solutions are posted get 0% credit.

Exams:

- Midterm is Thursday March 15th in class.
- Final is Monday May 10th at 9:00 am.

Class web site: <http://scale.engin.brown.edu/classes/EN164S12/>