ENGN1640 Design of Computing Systems, Spring 2019

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

Prerequisites: ENGN1630 or 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):

- Class logistics and overview
- Introduction
    - Computer design objectives, history, and trends
    - Basic computing concepts
- Lab Foundations
    - Programmable logic
    - CAD Tools
    - Verilog
- Arithmetic units
    - Floating point format
    - Floating point operation
- Processor Design
    - ISA
    - ISA and assembly language
    - Single cycle processors
    - Pipelining
    - Pipelining hazards and mitigation
    - Branch prediction
- Memory hierarchy design
    - Cache memory
    - Virtual Memory
    - DRAM and Flash
- Input/output
    - Interrupts
    - Direct memory transfer
- Contemporary issues:
    - Superscalar design
    - Multi-threaded
    - Multi-cores

Books

- Computer Organization and Design by D. Patterson and J. Hennessy, 7th edition (RISCV).

Grading:

- Lab 50%
- Final 20%
- HW 20%
- "Job interview" quiz 10%

HW/Laboratory guidelines: One student per lab assignment. Labs will be submitted on Canvas, and written HWs will be submitted in class. The due date will always be on Fridays before 12:00pm. Lab assignments or written HWs lose 15% of the grade for every late submission day.

Academic code policy: collaboration on lab design choices is not allowed. Copying from colleagues or internet sources is not allowed. Any detected similarity because of collaboration will be treated as a violation of academic code. All copying incidents will be referred to the academic code committee for further investigation and action.

Class web site: http://scale.engin.brown.edu/classes/EN164S19/