EC413: Computer Organization – Fall, 2013

**Basics**

**Instructor:** Prof. Martin Herbordt, PHO 333  
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Course web page: [http://blackboard.bu.edu](http://blackboard.bu.edu)

**TFs:** Lake “David” Bu (GTF), Ian Bablewski (UTF), Drew Kelley (UTF)  
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Lab Hours: M5-6,7-8, T6-8, W6-8, Th4-8, Fr2-7, Su6-8

**Mission Statements:** “From gates to programs” and “How computers work”

**Course Description:** *(From programs to gates and back again)*  
EC413 is an introduction to the fundamentals and design of computer systems. The starting points are your basic knowledge of logic design and high-level language programming. The ending points are the ability to create a working computer from logic gates, program that computer in assembly language, and evaluate and understand and be able to evaluate design options. Topics include computer instruction sets, assembly language programming, logic design of arithmetic operations, design of sequential logic with registers and buses, CPU design (data path, control, integrating datapath and control, pipelining), performance evaluation, memory devices, memory systems (including caching and virtual memory), and I/O. In parallel there is a lab where the focus is on in-depth understanding of selected comp org topics, HDL design using Verilog, and system design methods.

**Course Style:** EC413 has both theoretical and practical aspects (lots of both!).

**Prerequisites:** EC311, Introduction to Logic Design  
- Familiarity with Xilinx ISE CAD tools  
- High-Level Language Programming, preferably in EC327

Various articles and tutorials (to be posted)

**Course Mechanics**

- **Grading:** Exams: 50%  
  - Quizzes: 4%-5%  
  - Homework Assignments: 8%  
  - Labs: 20%-25%  
  - Final Project: 15%-20%

- **Exams:** There will be two mid-term and a final exam. Exams may be open textbook and open notes (TBD), but no calculators are allowed.

- **Quizzes:** There will be 4-5 very short and relatively easy quizzes. Their purpose is to ensure that everybody keeps up. Quizzes are closed book and notes. Quizzes begin and end punctually (i.e., beginning precisely at 2:00 ending at 2:05 and 2:10 for 5 and 10 minute quizzes, respectively). There may also be 2-3 or more “attendance” quizzes.
**Attendance:** speaking of attendance .... Attendance is essential – much of what we cover in this course will be found nowhere else.

**Readings:** ... are also essential. There is no way we can (or would want to) go through all of the details of any topic during class. Good news - the textbook is a standard so you can expect your future colleagues to have learned Computer Organization in similar way.

**Homework:** There will be around 8 homework assignments. Unless stated otherwise, homework will be due at the beginning of class on the date specified. You are encouraged to turn in electronic copies, but hardcopies are OK too. Late homework will be penalized 20% for being up to one day late (starting from the beginning of the class when it is due) and will not be accepted thereafter. You are encouraged to work together to learn the material and to discuss approaches to solving homework problems. However, you must come up with and write up the solutions on your own. See academic honesty policy.

**Labs/Final Project:** There will be 7 labs and a major project. Much more about these later! But the rules for collaboration are the same as for homework: these are all to be done individually.

**Lab Practicalities:** The labs are open-ended in the sense that there is not a specified time during which the labs must be done. Rather, labs are assigned about a week before they are due and it is your responsibility to get them done on time, generally late Friday afternoons. The TFs will be in the lab about 15 hours during weeks when labs are due. Please note that the amount of time any particular lab takes can vary by an order of magnitude (from a few hours to a few days). The greatest determinants of duration are how well prepared you are before you start coding and how well you understand the tools. Much more about this later.

**Discussion Section:** The discussion section is run by the TFs and serves two purposes: a pre-lab and/or an extension of the lectures. Attendance is not required, but is strongly recommended (see previous comment on “duration”).

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**Administration**

**Office Hours:** Our office hours are listed above and the web site. The best time to catch me otherwise is right after class; the worst time is right before class! A few times during the semester I will be travelling and unable to keep office hours -- I generally announce this in advance.

**Email:** You are required to periodically check your email since that is the way many assignments will be distributed. Questions via email are always good. If the question/answer has general interest, I will broadcast it to the class (leaving the questioner anonymous); if the solution is very involved, we may need to go over it in person. Also, please check your email for unexpected occurrences like errors in assignments, cancellations, etc.

**Course Web Site:** The BlackBoard site is given above. I will use it to post class notes, lab and homework assignments, homework solution sketches, and other course information.

**Incomplete:** Incompletes will be granted only in accordance with university policy, which (broadly) requires a major personal (non-academic) crisis near the end of the semester.

**Course Notes:** Class notes will be handed out at the beginning of class (sometimes for several classes). Notes are often intentionally incomplete (for obvious reasons). You are encouraged to annotate them during class.

**Academic Honesty:** Please read the university academic honesty policy. If something is not clear, then ask. In particular, plagiarism is regarded as a serious offence.

**Distractions:** What was that? Please keep all electronic devices off during class.

**Punctuality:** I start class promptly so please be here on time (see “distractions”).

**Instructor Error:** Don’t be shy! If you see me make a mistake, please let me know right away. If you are not sure, that’s even better – it might give me a chance to clarify something.

**Your success** is something I really care about! All job markets are incredibly competitive, especially for the really cool jobs!, but students who succeed in this class have a very high probability of becoming successful computer engineers (and doctors, executives, etc.).