Computer Architecture

MET CS472 A1

Learn from Anywhere Course Format, Offered Simultaneously On Campus and Remote
Instructor will Conduct Class Remotely Via Zoom

Instructor: Dave Hendrickson
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TA/Grader: Karen Palmer (kspalmer@bu.edu)

Website: Blackboard (https://learn.bu.edu/) 20fallmetcs472_a1

Text: David A. Patterson and John L. Hennessy
               Computer Organization & Design: The Hardware/Software Interface
               Fifth Edition (ISBN 978-0-12-407726-3)
               Available at the BU bookstore or online. No other edition is acceptable!

Prerequisites: MET CS231 or CS232. **Do not ignore this!** You must be proficient in some language,
               comfortable handling arrays and classes of data.   Assembly language is helpful but not mandatory.

Description: Computer organization with emphasis on processors, memory, and input/output. Includes pipelining,
               ALUs, caches, virtual memory, parallelism, measuring performance, and basic operating systems
               concepts. Discussion of assembly language instruction sets and programming as well as internal
               representation of instructions. (In short, enable you to understand the internal workings of computers,
               what makes them fast, and what the primary design challenges are.)

Grades: There will be a midterm (30%) and a final (40%) which will together account for 70% of the grade.
               There will be also three programming projects (in the language of your choice) for the other 30%.
               Late submissions will be accepted with a 10% pro-rated penalty for each week late *except for the final
               project*.

               In general, an "A" will be awarded for work that totals 92-100% of the possible points, "A-" for 90-
               92%, "B+" for 88-90%, "B" for 82-88% and so on down to F for below 60%. Grades may be scaled
               upwards based on class scores (though rarely to get an A), but not downwards.

               Grades are YOUR responsibility. If you need a particular grade to get into the M.S. program, receive
               tuition reimbursement or stay academically eligible, then it is YOUR responsibility to perform at that
               level. "A" work will get you an "A" and "F" work (or cheating) will get you an "F". I must
               distinguish between exceptional work and that which falls short of that level. Do not expect the
               typical grade to be an A**. Grades of D or F are almost always the result of cheating or not doing
               projects.**

Fall 2020 COVID-19 Policies

Classroom Rotations: Classrooms on campus have new capacities that follow guidelines issued by state and local health and government authorities related to COVID-19 and physical distancing. Based on our classroom capacity and those students who have identified a preference for attending in-person, we will be below that capacity. As a result, there we be no need for any rotation of allowed attendance. Those of you who have specified a preference for in-person attendance will be able to do so every week. **However, be aware that I will be teaching remotely due to a medical accommodation.**

Compliance: All students returning to campus will be required, through a digital agreement, to commit to a set of Health Commitments and Expectations including face coverings, symptom attestation, testing, contact tracing, quarantine, and isolation. The agreement makes clear that compliance is a condition of being a member of our on-campus community.

You have a critical role to play in minimizing transmission of COVID-19 within the University community, so the University is requiring that you make your own health and safety commitments. Additionally, if you will be attending this class in person, you will be asked to show your Healthway badge on your mobile device to the moderator in the classroom prior to starting class, and wear your face mask over your mouth and nose at all times. If you do not comply with these rules you will be asked to leave the classroom. If you refuse to leave the class, the moderator will inform the class that they will not proceed with instruction until you leave the room. If you still refuse to leave the room, the moderator will dismiss the class and will contact the academic Dean's office for follow up.

Boston University is committed to offering the best learning environment for you, but to succeed, we need your help. We all must be responsible and respectful. If you do not want to follow these guidelines, you must participate in class remotely, so that you do not put your classmates or others at undue risk. We are counting on all members of our community to be courteous and collegial, whether they are with classmates and colleagues on campus, in the classroom, or engaging with us remotely, as we work together this fall semester.

Other General Policies

Attendance: Attendance is not a part of your grade (either in person or remotely). However, you are expected to take the exams at the scheduled time. If that is impossible, you must take the exam before the rest of the class. If you are a "no show" you get a zero.

Ethics: I try to be friendly and to inject humor into the lectures, but don't mistake that for anything less than a zero-tolerance policy toward cheating. YOU CHEAT, YOU FAIL, subject to procedural review.

All projects in this course are INDIVIDUAL. Feel free to discuss ideas with your classmates, but **any** shared code will mean an F for the course. **No exceptions!** It is not acceptable for someone else to do your work, whether that be a classmate, a spouse or anyone. Do not share even one line of code.

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Incompletes: Incompletes will be given only in the case of serious emergencies or other documented extenuating circumstances clearly beyond the student's control. Incompletes will NOT, repeat NOT, be given to students who abandon the class, students not satisfied with their grade, students who are too busy to complete the work on time or students who miss the final exam.

Backups: Buy a USB drive (they are cheap) and **back up your work on projects daily**. There are no project extensions or late penalties waived for a disk crash. (Or just email the code to yourself.)

SCHEDULE

Date	Topics	Related Reading
Sep 8	Course Overview, Number systems, Signed numbers	Chap. 1.2, 2.4, 2.5, 2.9, skim rest Chap 1
Sep 15	MIPS Instructions - Assembly Language and Internal Representation *First project assigned: Due Oct 6*	Chapter 2 (skip asm programming, focus on internal rep)
Sep 22	Measuring Computer Performance, CISC/RISC The Memory Hierarchy - Caches (Part 1)	Chapter 1.6 Chap. 5.1, 5.3, 5.4 (ignore math), 5.8
Sep 29	The Memory Hierarchy - Caches (Part 2), *Second project assigned: Due Nov 10*	
Oct 6	The Processor: Datapath and Control	Chapter 4.1 - 4.4
Oct. 13	NO CLASS – (Monday classes meet due to holiday)	
Oct 20	Pipelines (Part 1)	rest of Chapter 4
Oct 27	MIDTERM EXAM	
Nov. 3	Midterm Discussion, Pipelines (Part 2) *Third project assigned: Due Dec 3*	
Nov 10	Advanced Architectures - Superscalar, Superpipelining	
Nov 17	Parallelism, Multicores, OS Concepts, Virtual Memory, Start-of-the-Art Cache extensions	Chapter 6, Chap 5.6
Nov 24	Logic Design, Computer Arithmetic and ALUs	App. B: pp. 1-14
Dec. 1	Wrap-up	
Dec 8	Final Exam Review	
Dec 15	FINAL EXAM	