PURDUE UNIVERSITY

CS 25000: Computer Architecture
Summer 2017

Class:
MTWRF 8:30 AM, Room LWSN B151

Course Web Page:
http://courses.cs.purdue.edu/cs25000:start

Course Newsgroup:
https://piazza.com/purdue/summer2017/cs25000

Instructor:
Prof. Jeff Turkstra, jeff@purdue.edu, HAAS 128, 49-63088.

Office Hours:
MW 1:30pm-3:00pm
F 9:30am-11:00am

Teaching Assistants:
This course has two graduate teaching assistants and two undergraduate teaching assistants. The names, email addresses, and office hours for them are given below. All TA office hours will be held in the **LWSN B160 lab**.

Tuesday
| 1:00PM – 3:00PM | Liliane Ntaganda | lntagand@purdue.edu |
| | Graduate Teaching Assistant | |

Wednesday
| 1:00PM – 3:00PM | Mohit Sharma | sharm267@purdue.edu |
| | Graduate Teaching Assistant | |

Friday
| 12:00PM – 2:00PM | Manu Aggarwal | aggarw32@purdue.edu |
| | Steven Kidd | kidd9@purdue.edu |

Text:
Required
Essentials of Computer Architecture; Comer; Chapman and Hall/CRC, 2017
ISBN-13: 978-1138626591

Prerequisites:
Foundations of Computer Science – CS 18200
Programming in C – CS 24000
Programming proficiency is *absolutely* required

Course Outcomes:
A student who successfully fulfills the course requirements will:
1. understand the fundamentals of computing hardware, digital logic circuits, and data representation
2. understand processors including the central processing unit (CPU), instruction sets, and assembly language
3. understand physical and virtual memory systems, memory technologies, memory organization, and caching
4. understand input output mechanisms including the interconnection of computers and external devices, buses, and device drivers
5. understand advanced aspects of architecture including parallelism and power management

Rules for LWSN B160 lab
This class shares the computer resources in this computer lab. Keep the lab clean and quiet as a courtesy to others. You may work on any available computer even when the TAs are not present. The TAs reserve the right to reduce the number of students in the room. Do not expect the TAs to do your homework or lab work.

Class Attendance
You are expected to attend all classes. Attendance will be recorded for randomly selected class sessions in the form of iClicker quizzes. If you choose to attend class, please arrive in the classroom on time. You are expected to be quiet in class. If you must miss a class, you are responsible for procuring any material, information, handouts, announcements, etc., that you missed.

Preparation for Lectures
You should try to read over the relevant pages in the course text before arrival. Additionally, you are expected to check your email, the course website, and piazza regularly. Here is the *tentative* lecture schedule and corresponding chapters in the course text:

Wk	Lec	Subject	Book
1	1	Introduction and history	Chapter 1
	2	Computing and digital logic	Chapter 2
	3	Digital logic	
	4	Digital logic, gates, and sequential circuits	
	5	Sequential circuits, building blocks, data representation	Chapter 3
2	6	Data representation	
	7	Data representation	
	8	Processors, pipelines, and ISAs	Chapters 4 & 5
	9	Processors, pipelines, and ISAs	
	10	Designing a simple computer	Chapters 6 & 7
3	11	Assembly language	Chapter 9

	12	Assembly language, operand addressing	Chapters 7 & 8
	13	Operand addressing, microcode, and modes	
	14	END EXAM 1 MATERIAL	
	15	Pipelining	Chapter 5
4	X	**MIDTERM EXAM 1 – MATH 175**	
	X	July 4 Holiday	
	16	Pipelining, Hazards	
	17	Hazards	Chapter 5
	18	Instruction level parallelism (ILP), performance	
5	19	Memory technology	Chapters 10-12
	20	Memory system design	
	21	Memory hierarchy	
	22	Cache	Chapter 7
	23	Virtual memory	Chapter 13
6	24	Paging implementation	Chapter 8
	25	END EXAM 2 MATERIAL	
	26	Input/output	Chapters 14-17
	X	**MIDTERM EXAM 2 – MATH 175**	
	27	Input/output, programmed I/O	
7	28	Interrupt-driven I/O, device drivers, buffering	
	29	Buffering, parallel computers	Chapters 18, 20
	30	Parallel computers	
	31	Energy and power	
	32	Benchmarking	Chapters 21, 22
8	33	Modern architecture examples	
	34	Semester overview	

Homework
Homework assignments are assigned usually one per week and are due the following week. These are written assignments that are submitted electronically.

Other important notes on homework:
- ALL HOMEWORK ASSIGNMENTS ARE DUE AT 11:59 PM on the Sunday following their assignment.
- Late submissions will not be accepted, and will incur a grade of 0.
- If you feel you have a valid reason for not having your work done on time, then send the instructor an email **BEFORE** the assignment is due.

Quizzes
There will be a number of unannounced, 5 to 10 minute quizzes in class. The lowest grade will be dropped at the end of the semester. A score of zero will be given in case of absence.

Labs
There will be seven "labs" during the course of the semester. Attendance is mandatory. Students must attend their respective, registered lab session. The first hour of each lab session is reserved for students registered in that session. However, if you wish to ask questions of the TAs or use lab equipment, you may attend any lab session during its second hour on a space-available basis and with the permission of the graduate teaching assistant in charge.

Examinations
Exams will be closed book and closed notes. You must solve the exam problems yourself, without any help (knowing or unknowing) from any other student. You must not seek any knowledge in advance of the test questions (beyond that given in class) and must report any advance knowledge of the test questions by any student that you are aware of. You must not allow any other student access to your solutions during the exam. If the seating situation makes this difficult, please inform the instructor or Tas.

Midterm 1: Monday, July 3	8:30am	MATH 175
Midterm 2: Thursday, July 20	8:30am	MATH 175

Final: To be announced later

Regrades
Problems regarding grading of assignments, labs, and exams must be resolved within **two days** after the graded work has been returned to you. It is your responsibility to pick up the graded work on time. Grades will not be modified after the two day period.

Make-up Examination Policy
Make-up exams will be given only in the **most extreme** circumstances and require certification for such circumstances. Eg, a medical doctor's statement certifying that the student is **unable** to attend the scheduled exam. Any travel (including interview trips), load from work or from other classes, failed alarm clocks, or simply not being able to make it to the exam will **not** be grounds for a make-up. If you have any recurring medical problems that may unexpectedly prevent you from making it to class or exams, please obtain a doctor's statement certifying your circumstance.

Academic Integrity
As a student at Purdue you are subject to the *Purdue University Student Code of Conduct*, which enjoins you to respect the highest standards of honesty and integrity. All work that you submit in this course must be your own; unauthorized group efforts are considered academic dishonesty. See the online brochure *Academic Integrity: A Guide for Students* for definitions and sanctions. Academic dishonesty is a serious offense which may result in suspension or expulsion from the University. In addition to any other action taken, such as suspension or expulsion, a **grade of F** will normally be recorded on the transcripts of students found responsible for acts of academic dishonesty. Students are encouraged to report academic dishonesty to the instructor directly, or to the Office of the Dean of Students.

You may discuss assignments in a general way with other students, but you may not consult anyone else's written work. Among other ways to get an F, you are guilty of academic dishonesty if:

- You examine another student's solution to an assignment
- You allow another student to examine your solution to an assignment
- You fail to take reasonable care to prevent another student from examining your solution to an assignment and that student does examine your solution. For example, if you allow another student to check his/her email from your terminal while you step out of the room, you have failed to take reasonable care to prevent him/her from accessing your files.

Do not con yourself into thinking that you can hide any collaboration. The risk of getting caught is too high, and the standard penalty is way too high.

If we find reason to believe that a student has cheated on any assignment, we may inform the student promptly, or we may decide to silently accumulate evidence against the student on later assignments.

Grading
Final grades will be assigned according to the following *approximate* weighting:
Homework – 15%
Quizzes (in lecture) – 10%
Midterm exams – 20% (10% each)
Final exam – 15%
Laboratory projects – 40%

Questions and Answers
Questions of general interest should be posted on the course piazza site. Answers will be posted as soon as possible. Project questions should be directed to the appropriate project coordinator via email. Answers will be sent to you directly. If you need to contact a specific TA or instructor, send email to that individual or go see him/her during office hours.

Modifications
This syllabus may be modified at any time with notification.

*** *As an interesting side note, a significant portion of this syllabus is copied from Dr. Adams, Dr. Dunsmore, Dr. Hosking's, Dr. Brylow's, and Dr. Hu's policy pages from previous semesters. One of the major differences between plagiarism and proper reuse is giving credit where credit is due.* ***