Instructor: Dianne Foreback, Ph.D.

- e-mail: dforebac AT kent.edu
- office: MSB 266
- phone: (330) 672-9064 (best way to contact is via email)
- office hours: Tue and Thur, 10:45 a.m. – 12:00 p.m. and email me for an appointment please

Lectures: Tuesday & Thursday, 9:15 – 10:30 p.m. MSB Room 228

Course Prerequisite

CS 13001 (Computer Science I-Programming and Problem Solving). Students who do not have the proper prerequisite risk being de-registered from the class.

Course Overview

This course is intended primarily as a computer science course in computer architecture at the advanced undergraduate level. It focuses on a functional overview of computer systems, interconnection of basic components, system performance measures, instruction set design, arithmetic logic unit, control unit, memory system, pipelining, interrupts and input/output.

This is a three credit hour class with face-to-face lectures.

This course helps students to learn:

- The role of performance measurement and evaluation.
- The basics of an instruction set and assembly language programming using RISC architecture.
- The important principles of computer organization and key ideas such as representation of integers and floating-points numbers, and arithmetic algorithms.
- The key ideas in control mechanisms including pipelining.
- The organization and control.
- Principles of memory hierarchies and unifying the ideas of caching and virtual memory.
- The key principles of multiprocessors and multicomputer systems.

Textbook

Required: Patterson and Hennessy, Computer organization and design, the hardware/software interface, 5th edition, Morgan Kaufmann Publishers, ISBN-13: 978-0124077263, ISBN-10: 0124077269. The chapter sections in earlier editions are reorganized, figures and problem sets are different; thus, earlier editions will not coincide with lectures and exercises assigned from the book. It is the student’s responsibility to ensure the assigned problems coincide with their version of the book and, if not, obtain the correct problems.
Final Exam Date & Time

Final Exam: Tuesday, December 12th, 7:45 – 10:00 a.m. (early morning) in the regularly scheduled classroom (unless otherwise notified). You must bring your picture identification to the exam.

Class Web Page, Mailing List and Contacting the Instructor

The (case sensitive) web site for the class is http://www.cs.kent.edu/~dforebac/classes/ca. You can also access the class site my going to my homepage http://www.cs.kent.edu/~dforebac and clicking on the Computer Architecture link. The web site will contain links to the following course materials:

- Course syllabus
- Tentative Class Schedule
- Office Hours
- Lecture notes/Power Point Presentations (this may not be all inclusive, your attendance in class is necessary)
- Most Assignments/Projects (see assignment section for more details)
- Mailing List Information

There is a mailing list set up for the students taking this course. All students are required to subscribe to the mailing list within the first two weeks of class. I am going to send announcements and other class related information to this list. It is very important to be on this list to get the latest news and updates about the class. The subscription instructions are on the course’s webpage. You have to check your mail at least once a day while the school is in session.

The simplest and best way to contact me is via e-mail (dforebac AT kent.edu). If you need to talk to me in person, see me during my office hours or make an appointment via e-mail please.

When sending emails, use professional email etiquette. Include a greeting e.g. “Hello Dr. Dijkstra,” followed by an introduction of yourself that includes your FULL name and class attending (Computer Architecture), your question, and a closing, such as “Thank you,” followed by your full name. Also, in the subject area of the email header, include a brief description.

Lectures

Students are expected to attend each lecture. Reading materials and many presentations are posted on the course website. However, some material covered in lectures, including demos and problems assigned in class may not be available in these presentations. You are expected to attend class to obtain the full benefit of the course. Active participation during a lecture will help you learn the material and succeed in class.

Topics covered in lectures include: Computer Abstractions and Technology, Representing Numbers and Characters, Instructions: Language of the Computer, Instructions: Logical and Decision, MARS Simulator, Performance, Procedures and Addressing, Basics of Logic Design, Multiply and Divide, Floating Points, Clocking/Multiplexors/Logic, ALU, Single Cycle Datapath, Pipelining, Data Hazards, Control Hazards, Exceptions/Interrupts, and Memory.

Approximation of lectures and breakdown (rounded up). Computer Abstractions and Technology (approx. 1 lecture);
Representing Integers and Characters (unsigned binary, two’s compliment and signed magnitude integers, base conversions, encoding byte values , approx. 2 lectures);
Instructions: Language of the Computer (register, memory and immediate instructions, the constant zero, converting assembly to machine language, installing MARS and service routines, logical and decision instructions, supporting procedures in hardware, character/byte instructions; approx. 10 lectures),
Performance and Basics of Logic Design (performance, digital circuits and logic design, decoders and multiplexors, designing an ALU (approx. 3 lectures),

Multiplication and Division for Computers (integer multiplication and division hardware and instructions, approx. 1 lecture),

Floating Points (binary floating points, floating point base conversions and storage, floating point instructions, hardware and instructions, approx. 2 lectures),

Processor (instruction execution and control, building a datapath via a simplified and pipelined implementation, pipeline performance, hazards, branch prediction, stalls, exceptions, approx. 6 lectures),

Memory (memory hierarchy, cache and virtual memory approx. 2 lectures).

Exams

There will be a total of two exams, one midterm exam (held during class) and a final exam (held during finals week). Both exams are closed book, closed notes, and must be the student’s individual work. It is expected that you take each exam at the scheduled time, unless you make prior arrangements with me, or have a documented illness in which case I expect you to contact me BEFORE the exam. You will be tested on the material we covered in class, from the book, from additional resources, in the presentations, homework assignments and projects. The textbook or the slides alone may not be sufficient for adequate preparation for the exams.

The tentative dates are posted on the class website in the course schedule.

You must bring a picture identification to the exams.

We will review the exam once graded in class. You must return the exam immediately after our in class review to earn the assigned grade, and a request to review grading discrepancies must be noted on this day. You are responsible for attending class during the review.

Assignments

The lectures are complemented by homework problems, quizzes and programming projects. Most of these are posted on our class website. Occasionally, I may give homework problems during the lecture and not post to the site or email to students. Consider this type of assignment a version of a “pop” homework, similar to a “pop” quiz. I will not be emailing or posting such assignments.

The homework assignments will be pencil-and-paper; if your writing is not legible, zero points will be assigned to the answer. Late homework assignments are NOT accepted under any circumstance. However, if you scan your homework, or better yet, submit your answers as a pdf, place in your subversion folder under a “homework” folder, do not make any alterations to your homework, and bring your original homework assignment, unaltered from what is uploaded into subversion, I will accept your homework. BUT I must have your physical homework in my hands before class is over. Note, this is not an alternative way to submit your homework since it involves reviewing your hard copy and what is in subversion, along with the date submitted into subversion. I will only accept a late assignment once providing you adhere to these rules. You are permitted to turn in homework early, but again, a hard copy is required.

Homework Assignments

Aside from a possible unannounced homework problem, you will be given at least a week to complete an assignment. I expect a reasonable level of professionalism on submitted homework assignments. This includes:

1. Your name at the top of every page of the assignment.

2. Paper size should be on standard typewriter paper, 8.5 x 11 inches, or standard notebook size, approx. 8 x 10.5 inches. (not A4 or legal size paper or small half sheets of paper).
3. All pages stapled (preferred) or paper clipped, not folded at the corner.

4. If handwriting your answers, the ink or pencil should be dark, legible and of a normal size print (please do not write very small). Of course, the same goes if typing your document.

5. The problems should appear in the order of the assignment and numbered accordingly. Grading your answers should not require leafing through pages or searching for your answers out of order.

6. Scribble is not professional. You may use pencil so that you can erase providing your print is dark.

7. The ratted edges of paper that remain after tearing paper from a spiral notebook is not acceptable.

A violation of the above will result in several points being deducted. If an answer cannot be read, a score of zero is assigned.

You are responsible for attending class to obtain your homework on the day it is returned; this day may not be announced. If there are any grading discrepancies on the assignment, you must note it on this day, or at the latest, by the next scheduled office hours. If you cannot attend class, you may pick up your homework during office hours.

Quizzes. There will be approximately 4 quizzes. The tentative dates for quizzes are posted the class website in the course schedule. There are no make-up quizzes. If you miss a quiz, a grade of zero points is assigned. I will drop your lowest quiz score.

Programming projects. There will be approximately 3-5 programming projects. The projects will be submitted and graded electronically. The details on project submission will be given to you together with project assignment.

All assignments should be the student’s individual work. For coding projects, you should code the projects individually. This means that you should not look at other students' programs either on the screen or in printouts. You should not copy other students' solutions. Joint programming is not allowed (unless a group assignment is given).

You should be careful not to give others access to your code. This means that you should not keep your program in a publicly accessible directory, you should not leave your computer unattended, and you should not forget to pick up your printouts.

Late programming projects are not accepted. However, I may waive the late policy conditions for the programming projects only in case of a documented illness or another extraordinary circumstance. In either case, you have to contact me immediately. With respect to programming projects, my decision to grant you a waiver is partially influenced by the degree of completion of the work assigned.

Any grading discrepancies should be noted as soon as possible and by the end of the next scheduled office hours.

Additional policies may be posted on the class website.

Academic Integrity

Student-teacher relationships are built on trust. Students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments which students turn in are their own. Acts that violate this trust undermine the educational process. University policy 3342-3-01.8 deals with the problem of academic dishonesty, cheating, and plagiarism. None of these will be tolerated in this class. The sanctions provided in this policy will be used to deal with any violations. If you have any questions, please read the policy or contact the instructor. For the University's complete policy and procedure on cheating and plagiarism (policy 3-01.8) see: https://www.kent.edu/policyreg/administrative-policy-regarding-
student-cheating-and-plagiarism. The professor is obligated to report violations of this policy. Note, that a professor may assign a final course grade of an “F” if a violation of this policy occurs.

Cooperation on Homework Assignments and Programming Projects

For both homework assignments and programming projects, discussion with your peers is an excellent way to learn. If you don’t understand something, discussing it with someone who does can be far more productive than beating your head against the wall.

Having advocated discussion, then, I’ll be clear about what is allowed, and what is not. In general, students are allowed to cooperate as follows: you are allowed to discuss with other students the assignment, and general methods for solving the assignment. However, you are not allowed to work with someone else to actually solve the assignment, or to write code (even pseudocode) for a program, and you are certainly not allowed to copy anyone else’s solution; doing any of these things will be considered cheating, and will constitute grounds for failing the course.

All assignments should be the student’s individual work. For coding projects, you should code the projects individually. This means that you should not look at other students’ programs either on the screen or in printouts. You should not copy other students’ homework solutions. Joint programming is not allowed (unless a group assignment is given).

Note that there is a fine line between discussion and cheating. If you are unsure what is allowed and what isn’t, feel free to discuss the distinction with me, but if something feels uncomfortable, it’s probably not allowed.

Finally, you should be careful not to give others access to your code. This means that you shouldn’t keep your program in a publicly accessible directory, you shouldn’t leave your terminal unattended, and you shouldn’t forget to pick up your printouts. It is your responsibility to ensure your work is not publically accessible.

Grades

Your final course grade will be calculated as follows:

- midterm exam 100 points
- final exam 100 points
- quizzes (approx. 4) 10 points each (lowest quiz score dropped)
- programming projects (approx. 3 - 5) approx. 10 – 25 points each
- problem assignments (approx. 4 - 6) approx. 10 – 35 points each

To assess your final course grade, all point values assigned on graded materials are considered. This includes exams, programming projects, quizzes and homework assignments. The sum of possible scores on all assignments (homework, projects, quizzes and exams) is considered 100% and your final course grade will be determined as follows: 100-93% A, 92-90 A–, 89-87 B+, 86-83 B, 82-80 B–, 79-77 C+, 76-73 C, 72-70 C–, 69-67 D+, 66-60 D, 59-0 F. There will be no curve at the end of the course. Your score will not be rounded up: if you get 66.99% you will get a D not a D+.

Students with Disabilities

In accordance with University policy, if you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester. Students with disabilities must verify their eligibility through Accessibility Services (contact 330-672-3391 or visit www.kent.edu/sas for more information on registration procedure).
General Policies

Attendance: Although attendance is not considered when calculating a student’s grade, attending lectures and participating in class is to the benefit of the student. Those who attend and participate tend to perform better in class than those who do not. Again, I may give homework problems during the lecture and not post to the site or email to students. Consider this type of assignment a version of a “pop” homework similar to a “pop” quiz. I will not be emailing or posting such assignments or accept late homework assignments.

Make-up exams will only be given in the case of an excused documented absence or valid emergency (a routine doctor visit is not an acceptable excuse). I encourage you to contact me if an emergency arises, again, before the exam is scheduled. Please see the “Assignment” section for policies related to homework and projects.

If you believe there is an error in a graded assignment/exam/project, notify me immediately. That is, grasping for extra points at the end of the semester by asking me to reconsider earlier graded materials is not acceptable. You are responsible for attending class, in particular, during the returning of assignments and reviewing the exams.

Office hours: You are encouraged to attend office hours should you need additional instruction, but you must bring a specific question or area to discuss. If you missed class, ask a classmate for notes. Do not expect to receive additional instruction on material that you slept through. No appointment is required to attend office hours; students are helped on a first come, first serve basis. My office hours are posted on my website for this course. If my office hours conflict with your course schedule, please email me a request for an appointment.

Registration deadline: The official registration deadline for this course is 9/3/2016. University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashLine) prior to the deadline indicated. Registration errors must be corrected prior to the deadline.

Subject to Change Statement: The syllabus and course schedule may be subject to change. Changes will be communicated via email and in class.

Miscellaneous

Be courteous to your fellow classmates. Try not to be late for class and cause disruptions. Make sure you silence your cellphone. The use of laptops while the class is in session is allowed but only with my permission. If you take notes or otherwise cannot avoid using your laptop, obtain my permission within the first two weeks of classes. If given permission to use an electronic device and you are suspected of not using the device for class notes, your permission will be revoked. Researchers conducted studies and the attempt to multitasking learning and listening to lectures, reading email, etc. is not efficient.

No recording devices are permitted.