Syllabus: CS2700
COMPUTER ORGANIZATION & ARCHITECTURE
Department of Mathematics and Computer Science

Instructor:
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Office Hours: M 1500-1550, T 1100-1200, W 1730-1830, Th 1400-1500, or by appt.

Grading:

Assignments/Projects	30%		
Midterm	35%	about 5 Mar	
Final	35%	0745-0945, Th 11 May	

Course Description: This course introduces details of computer architecture and organization. It covers data representation, basic digital logic circuits, memory types and hierarchies, I/O and Storage devices, CPU architectures such as RISC, CISC, parallel, multi-core and GPGPU systems .

Prerequisites: CS2250 ←--can be taken concurrently with this class.

Required texts: *Computer Organization and Architecture Designing for Performance*, William Stallings , 10th ed. Prentice Hall Publisher, ISBN-13: 978-0-13-410161-3

Note: If you are using an earlier edition of this book, there are missing chapters in those editions and the problems are numbered differently. Also, the data in problems may be differently.

Course Topics:
Learn many of the acronyms and terms related to computer hardware.
Evaluate and compute mathematics related to low level system hardware.
Design and simplify rudimentary digital electronics circuits. (No soldering required!)
Perform elementary methods of error correcting coding.
Compute the speedup of a parallel computing system.
Understand computer components, CPU, Memory (Internal and External), Cache, IO, Operating System Support.
Analyze and perform, via pencil and paper, how computer arithmetic is done.
Analyze CPU Processor characteristics, addressing, structure. RISC vs. CISC.
Be able to define major characteristics of multicore, and several types of parallel processing.
Briefly cover other topics such as cloud computing and clusters.

Course Objectives:
At a high level our objective is the following. Proficiency in using mathematics and methods related to low level operations used in a computer. Identify major computer parts and why they need to exist. Create basic assembly language programs to exercise topics encountered in this class.

Well what does the above mean? This is a survey course, so by it's very nature it is going to be about describing, analyzing and evaluating elements of computer hardware and how it relates to many of the tasks encountered as a computer programmer. We will be taking a look at computer organization and architecture from the atoms all the way up to how, you as a programmer, might exploit what is presented in hardware. As a programmer you will have to take a look at different levels of abstract representations of hardware and its interface presented to you. In fact, there is a whole university degree called computer engineering which expands many of the topics explored in this course. In that degree you are actually designing computer chips and systems. In this course, I won't be asking you to memorize chip pinouts, etc. It is too specific. We may, however, study a few chips because of their historical importance. There is no one route to understanding computer hardware and in fact, this course will challenge you to actually challenge your stereotypes of computing in general.

We will need some math to help us get started and we will explore, through course readings, homework and a simple assembly language assignment, many of the elements of a computer. I will be bringing in many historical books and bits and pieces of computer hardware to help explain many of the topics in this course. The course text is a very good introduction to computer hardware and where the book is a bit light on a few important topics, I'll supply extra supplementary materials. Also, where applicable, I'll talk about how you can explore hardware hacking, using skills developed during this course.

Technology Requirements:
As a student in CS2700 course, you are expected to have **access to the internet almost every day**. If you have computing problems, it is your responsibility to address these, or come to campus to use the student computing labs. Problems with your computer or other technology issues are not an excuse for any delays in meeting expectations and deadlines for the course. So, if you have a problem, get help in solving it immediately. Problems with account, password, and connection should be handled by the Help Desk, with all other problems check with your instructor.

E-mail requirement:
All correspondence will be made through your UMSL email.

Attendance:
Announcements of any changes in the syllabus, test dates or assignments will be made in class. **You are entirely responsible to the material as well as any other information you missed while missing classes. I don't give makeup lectures.**

In my experience there are 2 major reasons that students don't pass: 1) they don't come to class and they don't drop, or 2) they don't ask for help. If you drop, I can give you an EX grade; if you don't, I have to give either F of FN, and both count in the GPA. If you need help, don't be afraid to ask for it; that's why there are office hours and tutors in the lab.

Schedule *(Tentative)*

Week	Chapter	Topic
1	1,2	Introduction, History, Ahmdahl's Law.
2	9,10	Number Systems, Computer Arithmetic
3	11	Digital Logic
4	3	Bus Architectures
5	4,5	Cache Memory, Internal Memory
6	6,7	External Memory, Input and Output Devices
7	7,8	I/O, Operating System Support
8		Carry Over
8		Mid-Term Probably on Th 5 Mar
9	12	Instruction Sets, Intro to Assembly Language
10	13,14	Addressing Modes, Processor Structure and Function
11	14,15	CPU: RSIC vs. CISC Architecture
12	15,16	RISC, Instruction Level Parallelism
13	16,17	Instruction Level Parallelism, Parallel Processing
14	17, 18	Parallel Processing, Multicore Computers.
15	19,20	GPGPU, Control Unit
16		Final W 10 May, 0745-0945, Our Class Room

Dropping:

You need to follow the proper drop procedure for getting excused from the course. A grade of F will be assigned to a student whose name is still on the final class roster and has not dropped the course officially. Delayed grades can be given only for a situation where a student has completed all the work and has to miss the final exam because of an emergency. The emergency has to be documented and valid. Delayed grades have to be approved by the Department of Mathematics and Computer Science.

Course Policies

1. Participation (expectations)

   o It is vitally important that our classroom environment promote the respectful exchange of ideas. This entails being sensitive to the views and beliefs expressed during discussions whether in class or online. Please speak with me before recording any class activity. It is a violation of University of Missouri policy to distribute such recordings without my authorization and the permission of others who are recorded.
   o Your success in this course will heavily depend on your ability to communicate, engage and participate in all course activities. Successful completion of this course requires that a student keep up with all assignments, quizzes, projects and tests.
   o If you are unable to participate in the scheduled class activities, you must notify the instructor within the week of that class module. **An unexcused failure to engage or participate with the class will be counted as an absence; unexcused absences may result in failure.** The instructor reserves the right to make judgment to accept and/or make–up assignments missed because of failed participation in the course activities.

2. Academic Integrity/Plagiarism

   o You are responsible for being attentive to and observant of University policies about academic honesty as stated in the University's Student Conduct Code.
   o Academic dishonesty is a serious offense that may lead to probation, suspension, or dismissal from the University. One form of academic dishonesty is plagiarism – the use of an author's ideas, statements, or approaches without crediting the source. Academic dishonesty also includes such acts as cheating by copying information from another student. Plagiarism and cheating will not be tolerated.
   o Academic dishonesty must be reported to the Office of Academic Affairs for possible action. The instructor shall make an academic judgment about the student's grade on that work and in that course. The campus process regarding academic dishonesty is described in the "Policies" section of the Academic Affairs website: http://www.umsl.edu/services/academic/policy/academic-dishonesty.html

3. Access, Disability and Communication

- o Students who have a health condition or disability, which may require accommodations in order to participate effectively in this course, should contact the **Disability Access Services Office**. Information about your disability is confidential.

  - 144 Millennium Student Center
  - Phone: (314) 516-6554
  - Website: http://www.umsl.edu/services/disabled/

- o If you have difficulty communicating in English with the instructor of this course, contact the **Office of International Students and Scholar Services**:

  - Phone: (314) 516-5229
  - Email: iss@umsl.edu
  - Website: http://www.umsl.edu/~intelstu/index.html

Student Support and Services

- **Technical Support**

  - My Gateway (Blackboard): If you have problems logging into your online course, or an issue within the course site, please contact the **Technology Support Center**:
    - Phone: (314) 516-6034
    - Email: helpdesk@umsl.edu
    - Website: http://www.umsl.edu/technology/tsc/

- **Academic Support**

  - **The Online Writing Lab**: At our My Gateway site, students can send their papers to our tutors, who will read them and send them back with suggestions. Students can also access SafeAssign, which identifies quoted material in their essays.
    - Visit the online Writing Lab page on MyGateway to submit drafts online.
    - We try to respond within 48 hours, but it may take longer, so allow ample time.

  - **NetTutor**: Online tutoring in many subjects is now available through NetTutor. In your courses on MyGateway, click on Tools and select NetTutor® to log in.

- **Student Services**:

  - The **Center for Student Success** offers assistance tailored to specific student needs.
    - 225 Millennium Student Center
    - Phone: (314) 516-5300
    - Email: css@umsl.edu
    - Website: http://www.umsl.edu/services/css/