Course Description

Introduction to the basic concepts of computer hardware structure and design, including processors and arithmetic logic units, pipelining, and memory hierarchy.

Course Topics:

Hardware Description Languages, Data Representation in Computer Hardware, Computer Arithmetic, Memory Organization, Control Unit Operation and Implementation, Instruction Formats, Pipelining and Vector Processing, Multiprocessing, and RISC Architecture and Principles.

Course Objectives:

Review the basic Boolean number representation schemes, digital logic gates, and basic combinatorial and sequential circuit structures.

Introduction to the basic roles and responsibilities for each of the major hardware components of a computer.

Review the need to use a memory hierarchy, perform memory management, and to explain to them the various memory management techniques and their tradeoffs.

Review implementation of the fundamental mathematical operations such as addition, subtraction, multiplication, and division and optimization with Boolean operands.

Review tradeoffs between complex instruction set computers (CISC) and reduced instruction set computers (RISC).

Review non-classical architectures such as parallel processors and pipelined machines which are used to accelerate hardware performance without impacting legacy sequential software programming languages or techniques.

Introduction to computer-aided design tools and hardware description languages useful to computer architects in performing functional verification and performance measurements of digital systems.

Review operation of hardware and software working synergistically together.

Learning Outcomes and Course Goals

Course Goal:

To examine alternative organizations and architectures associated with the implementation of basic computer hardware functions such as the memory hierarchy and its management, central processing unit (CPU) and arithmetic logic unit (ALU), instruction sets, and RISC.

Course Learning Outcomes (CLO):

Upon successful completion of this course, students should be able to:

Understand the role of each major hardware component of a computer system and their synergistic interaction with each other and software.

Analyze and perform tradeoffs between the cost, performance, and reliability of alternative computer architectures.

Understand, analyze, and design digital logic structures for the basic combinational and sequential circuits.

Understand the alternative binary internal representation of information (such as sign-magnitude, one's complement, two's complement, and floating point) along with their optimizations and tradeoffs.

Be able to perform basic mathematical operations (add, multiply) in the various Boolean number representation schemes.

Understand the operation of, and be able to analyze from a cost/performance standpoint, certain optimized hardware structures.

Appreciate the need to use a memory hierarchy and understand how locality of memory referencing in typical programs can be leveraged to perform effective memory architecture management.

Understand and emulate the various mapping, replacement, and dynamic memory allocation algorithms for cache and virtual memory management.

- Avoid wearing baseball caps or hats with brims
- Ensure your computer or device is on a firm surface (a desk or table). Do NOT have the computer on your lap, a bed, or other surface where the device (or you) are likely to move
- If using a built-in webcam, avoid readjusting the tilt of the screen after the webcam setup is complete
- Take the exam in a well-lit room, but avoid backlighting (such as sitting with your back to a window)

Remember that LockDown Browser will prevent you from accessing other websites or applications; you will be unable to exit the test until all questions are completed and submitted

Getting Help
Several resources are available if you encounter problems with LockDown Browser:

The Windows and Mac versions of LockDown Browser have a "Help Center" button located on the toolbar. Use the "System & Network Check" to troubleshoot issues. If an exam requires you to use a webcam, also run the "Webcam Check" from this area
Respondus has a Knowledge Base available from support.respondus.com. Select the "Knowledge Base" link and then select "Respondus LockDown Browser" as the product. If your problem is with a webcam, select "Respondus Monitor" as your product
If you're still unable to resolve a technical issue with LockDown Browser, go to support.respondus.com and select "Submit a Ticket". Provide detailed information about your problem and what steps you took to resolve it

Final Examination or Evaluation

There shall be an appropriate final examination and evaluation at the scheduled time as indicated in University calendar, unless specifically exempted by the college dean who has curricular responsibility of the course. The examination is expected to have descriptive, problem analysis and problem solving style questions to answer.

Grading Information

1. Project carries **50%** towards final score. Average of 3 score from projects will be contributed.
2. Quiz carries **20%** towards final score. Average of 4 score from quiz will be contributed.
3. Midterm carries **10%** towards final score.
4. Final carries **20%** towards final score.

Submission is allowed till **11:59 pm on due date**. Zero delay tolerance for the submission, i.e. NO late submission is permitted, unless you make special arrangements with your instructor beforehand.

You will receive a numeric score for the midterm, the final, each of the total homework, and each project submission. Letter grade, which is your class grade, will be obtained by adding the numeric scores and weighing with the percentages given below. Fraction in percentage will be converted into nearest integer value ('>= 0.5' will be moved to next integer number, '< 0.5' will be moved to previous integer number).

A+ = 100

Classroom Protocol

1. **You must come to class on time!** Students entering the classroom late disrupt the lecture and / or the students already in class who may be engaged in lab or discussion. Late students will not be accepted in class.

2. If you miss a lecture you are still responsible for any material discussed or assignments given. A large portion of each class will be used for hands-on lab / discussion. All students are expected to participate in class activities. Students who are often absent will find themselves at a disadvantage during the tests.

3. No audio / video recording or photography in the classroom without prior permission of instructor.

4. It is individual **student responsibility** to **check validity** of his/her submission (format error, blank files, corrupted files, and many more such) and re-submit within deadline if needed. Once the grading is started there will be no consideration for resubmit. If the submission found to have any logistics issue at grading time (format error, blank files, corrupted files, and many more such) it will be evaluated as 0

5. No personal discussion or cell ion fAf nem

Course Schedule *subject to change by instructor with due notice.*

Date	Lecture	Lab	Notes
01/23/20	Intro CS147		
01/28/20	Introduction to Computer, Basic Instruction Set, ALU	Tool setup	**Project I Posted** **Submit Prerequisite Survey & Syllabus Agreement**