CptS 260: Introduction to Computer Architecture

Fall 2019

Instructor:	Nadra Guizani	**Time:**	M/W/F 2:10 pm - 3 pm
Email:	nadra.guizani@wsu.edu	**Place:**	BRYN 305.

Office Hours: Tuesday- 2 pm - 5 pm , Thursday- 9 am - 12 pm @ EME 123
TA Office Hours(@Slaon 335): *Jihee* –(Mon/Fri : 3:30 - 5:00), *Shantonu* – (Wed: 3:00 - 4:30)

Course Description: Understand fundamental principles in computer architecture, including (but not limited to): MIPS instruction set, CPU implementation (datapath and control, pipeline), Memory hierarchy, and I/O. In particular, you will also learn how to write assembly code and understand its relationship to a high-level program written in C.

Prerequisites: CPT_S 223 Advanced Data Structures C/C++

Objectives: This course is to delve into more C++ related programming. Though the lectures and the textbook will continue to get more acquainted with C++ and its different functionalities. Carefully complete all of the programming assignments and practice different problems given in class and through out the book.
Specific Goals of this course are as follows:

1. Instruction Sets
2. Computer Performance
3. Integer Representation and Arithmetic
4. Coding in MIPS: loops and function calls;
5. Basics of Digital Design
6. Single Cycle Simple MIPS Architecture
7. Pipelining and Pipelined MIPS Architecture
8. Memory Hierarchy and Cache Memory Design
9. Virtual Memory
10. Input/Output

Course Material:

1. All course material will be uploaded on **Blackboard**
2. **Main Course Textbook:** Computer Organization and Design (Fifth Edition): The Hardware/Software Interface by David A. Patterson and John L. Hennessy.
3. **Reference Textbook:** Computer System Architecture (3rd Edition) M. Morris R. Mano
4. **Required Software:** We will be using the SPIMS simulator (qtspim 9.1.20) please download and install that onto your respective OS/machines through this link.

Tentative Course Outline:

- Concept of instruction set
- Formulas and Gates; Unsigned numbers and Signed numbers; Characters in bits
- MIPS basics: memory and registers; Conversion from C to MIPS;
- Coding in MIPS: loops and function calls
- Instruction types, Multiplier and Floating numbers; Newton's Method
- Single cycle processor; Data path and control;
- Pipeline, control and data hazards;
- Memory and cache; Direct map and set associative caches;
- Virtual Memory and Paging;
- Coding in Interrupt;
- Multiprocessor basics: cache coherence and synchronization;

Grading Policy: Your final grade in this class will be based on the following categories:
35% Assignments
10% Quizzes
5% In-Class Participation/attendance
20% Two mid-semester exams
30% Final exam

Tentative Course Exam Dates:

1. Exam 1 - Sept 25^{th} In Class **(CONFIRMED)**
2. Exam 2 - Nov 6^{th} In Class **(CONFIRMED)**
3. Final Exam (Comprehensive) - Monday Dec 9^{th} (8:00 10:00 a.m.)

Course Policy:

- We will have weekly/biweekly homeworks and quizzes. Quizzes will be given at the beginning of class on material we have covered the week/weeks before.
- **Late Work:** Assignments are due by the established due dates and times. You may hand in an assignment up to two days late (the weekend counts as one day), at a penalty of 10% per 24 hours late. Forty-eight hours after the assignment is due, you may no longer hand in the assignment for credit. At that time, the link to the solution key for the assignment will be available. If an emergency occurs, the instructor will accommodate the student as much as possible. Make-up exams will not be possible unless the student speaks with the instructor at least two days in advance. I understand emergencies do occur and rescheduling of exams because of these is to be determined by the instructor.
- Non-programmable homework problems should be typeset (a great way to start learning the use of LaTeX , overleaf), and all programming codes should be well documented.
- Official homework solution will be posted on the course blackboard two days after the due date.
- All homework solutions, programming codes, etc., **must be submitted electronically through Blackboard**
- You may discuss homework problems with other students, but you must write up your homework independently in your own words.
- All exams are closed book (unless otherwise stated), and you are not allowed to use any electronic devices such as mobiles and tablets.

- Be courteous when using mobile devices. Make sure your cell phone is turned fully off, or silent. No texting, reading emails, playing games, or streaming from one of the various options at your disposal.
- If you need to use your laptop to take notes please make sure that all sounds are turned off.
- If you have to miss a lecture, then I recommend you study the material you missed before you return to class. Always feel free to come by office hours or contact me if you need clarification on any of the materials.

Grading Scale

Grade	**Percentage**	**Grade**	**Percentage**
A	94-100	C	70-73
A-	90-93	C-	66-69
B+	86-89	D+	62-65
B	82-85	D	58-61
B-	78-81	F	<58
C+	74-77		

Academic Honesty:
The following official statements are from this link. Academic integrity will be strongly enforced in this course. Any student caught cheating on any assignment or violates WSU's Standards of Conduct for Students will be given an **F grade for the course** and will be reported to the Office of Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions. I encourage you to work with classmates on assignments. However, each student must turn in original work. No copying will be accepted. Academic integrity is the cornerstone of the university.
In the end, the work that you submit must be your own.

Notice to Students with disabilities/medical conditions:
Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations must be approved through the Access Center. For more information contact a Disability Specialist on your home campus: **Pullman or WSU Online:** (509-335-3417) http://accesscenter.wsu.edu. **Spokane:**http://spokane.wsu.edu/students/current/studentaffairs/disability/ **Tri-Cities:** http://www.tricity.wsu.edu/disability/ **Vancouver:** (360-546-9138) http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services