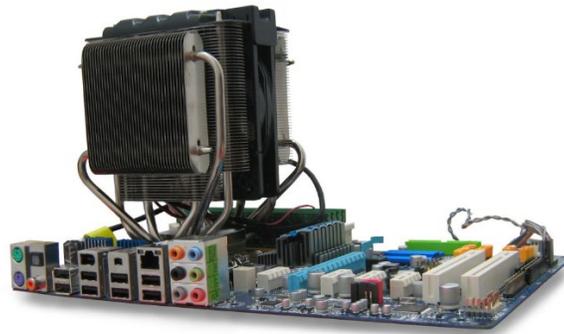


Computer Systems



CS3443 – Fall 2020 Online Syllabus

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General Course Information

Time & Location: Online

Instructor Information:

Instructor: Dr. Shital Joshi
Email: Shital.Joshi@okstate.edu
Office: 229 MSCS; Stillwater, OK 74078-1053 USA
Phone: 1-405-744-5273
Virtual Office Hours: Tues/Thurs 3:30 – 4:30 PM (CT) and by appointments

Course Credit: 3.0

Prerequisites: CS 2133 with a grade of “C” or better

Textbooks: David Patterson and John Hennessy “*Computer Organization and Design: The Hardware/Software Interface*”, 5th edition, Morgan Kauffman Publisher, 2013. ISBN: 978-0-12-407726-3.

Software: [SPIM MIPS Simulator](#)

Course Overview

Learn in detail functional and register level description of computer systems, computer structures, addressing techniques, macros, linkage, input-output operations. Introduction to file processing operations and auxiliary storage devices. Material is supplemented by programming assignments, which are implemented in assembly language.

Course Objective

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

- Demonstrate programming proficiency using various addressing modes and data transfer instruction of the target computers.
- Program using the capabilities of the stack, program counter and registers and understand how these are used to execute a machine code program.
- Understand various conventional computational organizations and their strengths and weaknesses.
- Understand the concept of memory hierarchy.
- Understand how I/O devices interface with the processor, memory.
- Understand interrupts and how can they be handled.
- Analyze and evaluate computer performance.
- Analyze MIPS microprocessor design and MIPS instruction set architecture.
- Describe how a CPU performs instructions during fetch-decode-execute cycle and how memory supports its actions taking MIPS as a reference architecture.
- Understand how pipelining can improve CPU performance for MIPS architecture.



Canvas Classroom for the Course

The course uses Canvas which can be accessed at <https://canvas.okstate.edu>. Students can sign in using their O-Key username and password provided by OSU. After sign-in, students can see the Canvas *Dashboard*, which provides a list of links for the courses in which they are enrolled. This course will be listed as CS 3443 Computer Systems Online Fall 2020. Click on that link to go to the course homepage. Near the left side of that page is a menu of links, with Home (the homepage) at the top.

The three primary sections of the Home page are:

- *Home* (at the top) provides you all the lecture videos and additional materials/handsout for the course. You can find your syllabus in this section.
- *Announcements* (near the top) provides you with important and time-sensitive updates and comments on class matters. Should something happen to prevent the instructor from being available during his office hours on any given date, he will make an effort to post a notice in this section of the Canvas classroom.
- *Assignments* (below Announcements) contains all the documents related to assignments and from this section you will be able to submit your assignments.
- *Discussions link* (in the left-side menu) takes you to the list of course discussion forums. Here, you will find a forum labeled Student Lounge for nifty news and casual conversation, a general Q&A forum where questions/discussion concerning assignments or other aspects of the course can be posted, as well as Assignment Forums, in which specific, topical discussion prompts will be posted by the instructor. Please keep your comments clean and civil.

Since this is an online course, it is students' responsibility to keep track of all announcements, course contents and due dates.

Grading Policy

The final grade will be assigned based on the point total as:

90% -- 100%	A
80% -- 89.99%	B
70% -- 79.99%	C
60% -- 69.99%	D
Less than 59.99%	F



Course Assignments and Grading Information

Assignments

The course assignment is categorized as *home assignments* and *participation in discussions*. There are 5 home assignments throughout the semester, which include written assignment, programming assignments (MIPS Programming) and numerical problems. Students will have a total of 7 days (including holidays) to submit the assignments. All assignments must be submitted through Canvas. Any submission made through email will not be entertained. All your assignments will be checked in [Turnitin](#) for any plagiarism.

Since this is an online course, discussion forms an integral part of the grade. Each student is expected to post at least three posts in a weekly conversation. The topic of discussion will be given related to the subject matter discussed in the previous week. The students' post should demonstrate their understanding of the material. Each student should demonstrate that they have observed the video lecture of the past week and have understood the topic well. Based on the video lecture and/or assigned topic, the students should give their response. Students can give multiple views on other students' response. Simply by stating "I agree" or "That is an interesting idea" will not earn any credit. Students' response will be graded based upon their analysis and the critical thinking. Focus will be given to the response that indicates the ability to handle the conceptual ideas rather than the response containing just a fact.

For the 1st post (each Monday -- Thursday of the current week), each student needs to post at least one question based on the past week video lectures. Each student needs to post his/her question within 3 days from the day link is made available. When posting question, you have to give what you understood first then the confusion/doubt you have on that topic. This will help other students to answer your doubt clearly. In the 2nd post (each Thursday -- Saturday of the current week), each student needs to submit his/her answer to somebody's else question. The 3rd post (each Sunday of the current week) each student need to post his/her final understanding on the question he/she has posted on the 1st post. If any student is not satisfied by any answers posted by fellow students, then students are encouraged to contact me and write appropriate response by the specified duration.

Students are free to post any many questions as they want and answer multiple times. However, I will look for the quality of the post. So, all the questions and answers must be relevant. Focus of reasoning rather than just fact. Grading will be done based on the post that falls within the specified duration.



Grading Information

The final grade will be calculated based on individual grades received on home assignments, discussion participation, mid-term exam and the final exam. The weighting for each of these are:

Home Assignments	40%
Participation in Discussions	30%
1 st Exam	15%*
2 nd Exam	15%*
Final Exam	15%*

Best of two exam score would be considered.

Due dates and Late Work Policy

Each assignment is due by 11:59 PM (CT) on the date specified on the assignment handout posted on the Canvas classroom site. Late penalty is 10% per class day. Assignments turned after a week late from the due date will not be accepted. Late work policy for 1st discussion post is same as that of the assignment but for 2nd and 3rd discussion posts, late work policy is different. Failure to post response to these discussions within the specified time will lead to 0 for that particular post.

Collaboration Policies

Each assignment is to be submitted individually. However, students can discuss concepts, ideas and techniques among their peers/instructor. After discussion, each student must write up his/her own solution. Copying another person's work, in part or in whole, is not allowed. Sharing solution, in part or in whole, is considered cheating as well. If any student is unsure whether collaboration is acceptable, speak with the instructor in advance. Students are responsible to take care of their solutions and prevents it from leaking.

Exam Logistics

Exams must be administered by a proctor or proctoring service approved by OSU. The exams must be taken within the days specified:

1 st Exam	Sep 24 th and Sep 25 th , 2020
2 nd Exam	Oct 29 th and Oct 30 th , 2020
Final Exam	Dec 9 th and Dec 10 th , 2020

We will use Examity for our course and the proctoring service will be Level 3. You can get additional information at: <https://osuonline.okstate.edu/Proctoring.vbhtml>.



Additional Information

Getting Help in this Course

Any questions concerning the content of the course and assignments should be directed to the appropriate course discussion forum. This allows your questions to be answered by anyone monitoring the discussion forum and the answer can be beneficial to all the board reader. Students can expect that the course instructor to respond any question posted in the discussion forum within 24 hours.

If any students need any additional help, they are encouraged to email the instructor at the instructor's email address. The typical respond time will be within 24 hours. For prompt response, please include the course number in the square bracket, followed by the brief message subject; for example:

[CS 3443: Online] MIPS Error: Exception occurred at PC = 0x00000000

Technical Support

You can reach OSU Arts & Sciences Outreach Office at:

Email: casoutreach@okstate.edu

Phone: 1-405-744-5647

Syllabus Attachment

Other useful information, such as important dates throughout the semester, can be found on the [OSU-Stillwater syllabus attachment](#) and the [OSU-Tulsa syllabus attachment](#) for the current semester.



Course Schedule

Week	Topics
1 (08/17 -- 08/23)	Introduction and Performance: Technology trends; Basic Organization of Von Neumann machine; Measuring CPU performance; Amdahl's law and averaging performance metrics
2 (08/24 -- 08/30)	MIPS Introduction: Components of an instruction set; understanding instruction set from implementation perspective; introduction to RISC and CISC architecture and example instruction set.
3 (08/31 -- 09/06)	MIPS Continuation: Representing instructions for arithmetic operations; logical operations; decision-making. Individual programming assignment 01
4 (09/07 -- 09/13)	MIPS Continuation: Supporting procedures; handling 32-bit immediate and addresses; implementing arrays and pointers.
5 (09/14 -- 09/20)	x86 Instructions and comparison with MIPS instructions; various steps in transforming a C program in a disk to a running program Individual programming assignment 02
6	Review and 1 st Examination
7 (09/28 -- 10/04)	Number Representations: Signed and Unsigned number representation; Fixed- and floating-point systems
8 (10/05 -- 10/11)	Datapath Design: Logic design (combinational logic and sequential logic); building a datapath; simple implementation scheme of datapath and control unit for MIPS architecture Individual assignment 03
9 (10/12 -- 10/18)	Pipelining: Overview of pipelining; non-pipelined vs pipelines performance; data dependencies; pipeline hazards Individual assignment 04
10 (10/19 -- 11/25)	Memory Hierarchy: Introduction to memory systems; basics of Cache; measuring and improving Cache performance



Week	Topics
11	Review and 2 nd Examination
12 (11/02 -- 11/08)	Memory Continuation: Measuring and improving Cache performance, Virtual memory
13 (11/09 -- 11/15)	Memory Continuation: Address translation and TLBs Individual assignment 05
14 (11/16 -- 11/22)	I/O Devices: Common I/O device types and characteristics; I/O mapping; interrupts; data transfer between I/O devices and memory.
15	Thanksgiving and Christmas Holiday
16 (11/30 -- 12/04)	I/O Continuation: Data transfer between I/O devices and memory Multiprocessors: Cache consistency; cache coherence problem
Final examination	
<ul style="list-style-type: none">This is just a tentative course schedule. It may evolve throughout the semester. <p>Any changes in the schedule will be announced via announcement. So, students are encouraged and expected to closely keep track of announcement section.</p>	