



Course Syllabus

Course Information

CS/SE 2340.501 – Computer Architecture

Term:

Fall 2020

Days & Time and Location:

TTh 5:30PM - 6 :45PM @ Virtual using MS Teams

Instructor Contact Information

Nhut Nguyen, Ph.D.

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Email: nhutnn@utdallas.edu

Office hours: virtual using MS Teams

Course Modality and Expectations

Instructional Mode	This course will be conducted using Remote/Virtual modality with asynchronous access (see below). Refer to this page for the description of modalities: https://www.utdallas.edu/fall-2020/fall-2020-registration-information/
Course Platform	This course will be delivered via Microsoft Teams . Please refer to this guide: https://www.utdallas.edu/oit/howto/microsoft-teams/ for information on how to install and use MS Teams.
Expectations	If you are not taking the course in asynchronous mode you are expected to attend the live sessions as scheduled and participate in discussions and other activities during a live session. If you have notified the instructor and are in asynchronous mode you are expected to study in the same pace as students who are in the synchronous mode, and to perform all quizzes or exercises assigned during a live session within 24 hours after the end of the session. Note that the due date for all assignments will be the same for all students regardless of learning modality. Participation in course discussion board on eLearning is also expected regardless of learning modality.
Asynchronous Learning Guidelines	Refer to this link https://www.utdallas.edu/fall-2020/asynchronous-access-for-fall-2020/ for information on asynchronous access.

COVID-19 Guidelines and Resources

The information contained in the following link lists the University's COVID-19 resources for students and instructors of record.

Please see <http://go.utdallas.edu/syllabus-policies>.

Class Participation

Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Class Recordings

The instructor may record meetings of this course. Any recordings will be available to all students registered for this class as they are intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Class Materials

The Instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

Course Pre-requisites, Co-requisites, and/or Other Restrictions

CE/CS/TE 1337 or equivalent, and CE/CS/TE 2305 or equivalent.

Course Description

This course introduces the concepts of computer architecture by going through multiple levels of abstraction, the numbering systems and their basic computations. It focuses on the instruction-set architecture of the MIPS machine, including MIPS assembly programming, translation between MIPS and C, and between MIPS and machine code. General topics include performance calculation, processor datapath, pipelining, and memory hierarchy. Students that have credit for CS 2310 or CS/SE4340 cannot receive credit for this course (3 semester hours).

Student Learning Objectives/Outcomes

After successful completion of this course, the student should

- be able to write a fully functional, stand-alone medium size assembly language program (e.g. a basic Telnet client)
- have an ability to represent numbers in and convert between decimal, binary, and hexadecimal and perform calculations using 2's complement arithmetic
- understand the basic model of a computer including the datapath, control, memory, and I/O components
- be able to program efficiently in an assembly level instruction set, including the use of addressing modes and data types
- understand the role of compilers, assemblers, and linkers and how programs are translated into machine language and executed
- be able to demonstrate comprehension of a pipelined architectures including datapaths and hazards
- understand the memory hierarchy including caches and virtual memory
- be able to demonstrate comprehension of computer performance measures and their estimation

Required Textbook:

"Computer Organization and Design - The Hardware/Software Interface – 5th Edition", Patterson and Hennessey, Morgan-Kaufmann, 2013. ISBN-13: 978-0124077263. **Note: there are several editions of the same title, make sure that you get the correct edition (for MIPS).**

Required Course Materials:*RISC ASSEMBLER/SIMULATOR*

It is assumed you are familiar with the PC environment, can create and edit text files, run programs, etc. The programs will be in assembly language for the MIPS processor. This course uses the MARS MIPS assembler and simulator. MARS is available, free, for download from the Internet through the site:

<http://courses.missouristate.edu/kenvollmar/mars/>.

The MARS simulator can assemble MIPS assembly language source files, load and run them with a users console window for input/output, and debug them if they do not work properly.

Technical Requirements

In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the [Getting Started with eLearning](#) webpage.

Course Access and Navigation

This course can be accessed using your UT Dallas NetID account on the [eLearning](#) website.

Please see the course access and navigation section of the [Getting Started with eLearning](#) webpage for more information.

To become familiar with the eLearning tool, please see the [Student eLearning Tutorials](#) webpage.

UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The [eLearning Support Center](#) includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

Communication

This course utilizes online tools for interaction and communication. Some external communication tools such as regular email and a web conferencing tool may also be used during the semester. For more details, please visit the [Student eLearning Tutorials](#) webpage for video demonstrations on eLearning tools.

Student emails and discussion board messages will be answered within 3 working days under normal circumstances.

Distance Learning Student Resources

Online students have access to resources including the McDermott Library, Academic Advising, The Office of Student AccessAbility, and many others. Please see the [eLearning Current Students](#) webpage for more information.

Server Unavailability or Other Technical Difficulties

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the online [eLearning Help Desk](#). The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

Assignments & Academic Calendar

Exams: There will be three exams during the course: two midterms and a final exam. The exams will be open notes: notes taken during the sessions can be used in the exams but no books or slides are allowed. The midterm exams will be limited to material covered during the immediate unit but the final exam is comprehensive. Test material will be taken mainly from classroom lectures.

Assignments: There will be regularly assigned reading and homework. Reading assignments should be done before the class session. Homework will require the student to spend time programming a computer outside of class. It includes a program to demonstrate the correct operation of the assigned tasks.

There will be regularly assigned in-class exercises that will be used to assess student's participation.

Assignments should be submitted using your eLearning account. Each programming assignment must contain:

1. A copy of the final working assembly language source code with comments and documentation. The file should be "text-only" and the extension must be ".s" or ".asm".
2. A screenshot showing keyboard input and displayed output from the console.

Project: A team programming project will be assigned. Details will be announced in the class.

Class Schedule

Session	Date	Topic	Reading	Assignments	Due
1	Aug 18	Introduction			
2	Aug 20	Intro to computer organization	Ch 1		
3	Aug 25	Introduction to Assembly Language Programming	Appendix A	HW #1	
4	Aug 27	Performance evaluation, Amdahl's law	Ch 1.6,1.9		
5	Sep 01	Data Representations, Bin/Oct/Hex	Ch.2.3		HW #1
6	Sep 03	Number Representations: signed, floating point	Ch.2.4	HW #2	
7	Sep 08	Instructions Representation	Ch 2.5		
8	Sep 10	Assembly Ops: Load/Store/Add/Sub/etc	Ch 2.2		HW #2
9	Sep 15	Comparing, Branching and Looping	Ch 2.7	HW #3	
10	Sep 17	Bits and bytes manipulation & other instructions	Ch 2.6		
11	Sep 22	Exam I discussion			HW #3
12	Sep 24	<u>Exam I</u>		HW #4	
13	Sep 29	Subroutines in Assembly language	Ch 2.8, A.6		
14	Oct 01	Comparing ISAs	Ch. 2.16-7		HW #4
15	Oct 06	Addressing modes & System software	Ch 2.10, 2.12-13	HW #5	
16	Oct 08	Integer Arithmetic	Ch 3.1-3.4		
17	Oct 13	Floating Point Arithmetic	Ch 3.5		HW #5
18	Oct 15	Input & Output		HW #6	
19	Oct 20	Interrupts and Exceptions	Ch 4.9, A.7		
20	Oct 22	Processor: Datapath & Control	Ch 4.1-4		HW #6
21	Oct 27	Exam II discussion		HW #7	
22	Oct 29	<u>Exam II</u>			
23	Nov 03	Processor: Pipelining	Ch 4.5		HW #7
24	Nov 05	Processor: Pipelined Datapath	Ch 4.6-8	HW #8	
25	Nov 10	Advanced Instruction Level Parallelism	Ch 4.10		
26	Nov 12	Introduction to memory hierarchy	Ch 5.1-3		HW #8
27	Nov 17	Virtual Memory	Ch 5.4-7		
28	Nov 19	Exam III			
29	Nov 24	No Class			Project

Grading Policy

The grade each student will earn from this class will be based on a weighted score calculated by using the following table:

Exam I	10%
Exam II	15%
Exam III	30%
Assignments	25%
Project	20%
	100%

Grades will be assigned according to the scale on the right:

Weighted Score	Grade
93.0 - 100	A
90.0 - 92.9	A-
87.0 - 89.9	B+
83.0 - 86.9	B
80.0 - 82.9	B-
77.0 - 79.9	C+
73.0 - 76.9	C
70.0 - 72.9	C-
67.0 - 69.9	D+
60.0 - 66.9	D
Below 60.0	F

Programming assignments grading:

Code Development	30%	(compile w/o error)
Program Execution	20%	(run successfully)
Program Design	25%	(conform to spec)
Documentation	15%	(program, comments)
Coding Style	10%	(clear, efficient)

Course & Instructor Policies

- *There will be no makeup exams under normal circumstances.*
- *No late homework or assignment will be accepted!*
- *I do not read e-Learning e-mails. Please use my UTD e-mail account above for any communications.*
- *Emails must include course and section number in the subject line. Emails that do not have this required information will be silently ignored.*

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.

Please go to [Academic Support Resources](#) webpage for these resources.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to <http://go.utdallas.edu/syllabus-policies> for these policies.

These descriptions and timelines are subject to change at the discretion of the Instructor.