

CS2340.005 Course Syllabus

Course Information

CS2340.005 Computer Architecture
Spring 2024

Professor Contact Information

Name	John Cole
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Office Location	ECSS 4.606
Email Address	John.Cole@utdallas.edu
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Office Hours	See Web site: https://personal.utdallas.edu/~John.Cole/#Office
Grader	TBA

Course Modality and Expectations

Instructional Mode	1. In-person. You will be expected to be in class. Attendance is not mandatory but will be taken. Classes will not be presented online unless the University requires it and will not be recorded unless the University requires it.
Meeting Time and Place	Monday/Wednesday from 1:00 to 2:15 PM Room: ECSS 2.306
Course Platform	Traditional classroom.
Expectations	You will attend every class on time, participate when appropriate, and silence your phone and put it somewhere off the desk and out of reach.
Asynchronous Learning Guidelines	None. Unless the University requires it, this class will not be offered asynchronously.

General Course Information

Prerequisites	CS1337 and CS2305 with a grade of C or better.
Course Description	This course introduces the concepts of computer architecture by going through multiple levels of abstraction, and the numbering systems and their basic computations. It focuses on the instruction-set architecture of the MIPS machine, including MIPS assembly

	<p>programming, translation between MIPS and C, and between MIPS and machine code. General topics include performance calculation, processor datapath, pipelining, and memory hierarchy.</p> <p>That was the catalog description. This course teaches you how computers work internally, including how to write in assembly language, how to create abstractions in an environment where there are none, and the relationship between machine code, assembly language, and high-level languages, specifically C++. You will also learn how memory works, how to evaluate processor performance, and much more.</p>
Learning Outcomes	<p>After successful completion of this course:</p> <ol style="list-style-type: none"> 1. Be able to write a fully functional, stand-alone medium size assembly language program 2. Have an ability to represent numbers in and convert between decimal, binary, and hexadecimal and perform calculations using 2's complement arithmetic 3. Understand the basic model of a computer including the datapath, control, memory, and I/O components 4. Be able to program efficiently in an assembly level instruction set, including the use of addressing modes and data types 5. Understand the role of compilers, assemblers, and linkers and how programs are translated into machine language and executed 6. Be able to demonstrate comprehension of a pipelined architectures including datapaths and hazards 7. Be able to demonstrate comprehension of computer performance measures and their estimation 8. Understand the memory hierarchy including caches and virtual memory
Required Text	<p><i>Computer Organization and Design - The Hardware/Software Interface</i> – 6th Edition, Patterson and Hennessey, Morgan-Kaufmann, 2013. ISBN-13: 978-0128201091. Note: Make sure that you get the correct edition and processor (MIPS).</p>
Required Course Materials	<p>This course will involve coding in the MIPS assembly language using MARS (MIPS Assembler and Runtime Simulator). Get it free here: http://courses.missouristate.edu/KenVollmar/mars/ The MARS simulator's help screen is very useful.</p>

Course Policies

Grading Criteria	<p>Major assignments 35%</p> <p>Tests (3) 60%</p> <p>Quizzes 5%</p> <p>Attendance: 0%</p>	<p>A=93-100</p> <p>A-=90-92</p> <p>B+=87-89</p> <p>B=83-86</p>
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		B-=80-82 C+=77-79 C=73-76 C-=70-72 F=below 70
Make-up Exams	Not allowed except for documented serious medical reasons. "I forgot to sign up with the testing center" is not a medical reason.	
Extra-Credit Work	None given. Please do not ask.	
Late Work	Reduction of 25 percent per day or partial day for any late submissions unless otherwise stated in the assignment. That is, if the assignment is worth 100 points, you will lose 25 points per day, in addition to points lost because of the quality of work.	
Grade Information	I do not curve individual assignments, but I may curve the entire course a little. Do not count on this. Do your best work. Grades will be posted in eLearning and you can use the weights above to see where you stand.	
Who Grades What	Online quizzes are auto-graded by eLearning. Your instructor grade tests. The grader grades programs.	
Grade Disputes	If you have an issue with your grade on a test or homework, talk to me. You have one week after a grade is posted to do so. Do not come in at the end of the semester looking for a better grade on the first test.	
Online Quizzes	You may be given take-home quizzes in eLearning. Often, these will be due before the lecture that covers the material. The purpose is to get you to read the material before you hear it in class. You may also be given in-class work to complete. These may not be made up if you miss them, and late work is not accepted.	

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Computer Science Department policy is that if you miss three consecutive classes your grade will drop one letter grade. Missing four in a row is failing.

Regular and punctual class attendance is expected regardless of modality. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes. These attendance requirements will not be used as part of grading (see Class Participation below for grading information).

Class Participation

Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. Participation 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). Class participation is documented by faculty. 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

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. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](#).

NOTE: if the instructor records any part of the course, then the instructor will need to use the following syllabus statement:

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](#).

Tentative schedule of topics. This is subject to change, and an updated version can be found at <https://personal.utdallas.edu/~John.Cole/2024Spring/CS2340Spring2024Schedule.htm>

Week	Date	Topic	Reading
1	Jan 17	Syllabus and instructor Web site review	Syllabus from coursebook
2	Jan 22	Introduction to Computer Organization	Ch. 1.1-1.5
	Jan 24	Introduction to Assembly Language Programming	Appendix A
3	Jan 29	Performance evaluation, Amdahl's law	Ch. 1.6, 1.9
	Jan 31	Data Representations: Binary, Hexadecimal, Octal	Ch. 2.3
4	Feb 5	Number Representations: signed, floating point	Ch. 2.4
	Feb 7	Instruction Representation	Ch. 2.5
5	Feb 12	Assembly operations: Load, Store, Add, Subtract, etc. Addressing modes.	Ch. 2.2
	Feb 14	Comparing, Branching, Looping	Ch. 2.7
6	Feb 19	Bit and byte manipulation, etc.	Ch. 2.6
	Feb 21	Test 1 Review	
7	Feb 26	Test 1 in the Testing Center	
	Feb 28	Subroutines in Assembly Language	Ch 2.8, A.6
8	Mar 4	Memory Allocation and the Heap	Slides
	Mar 6	Integer Arithmetic	Ch 3.1-3.4
9	Mar 11	Spring Break – No classes	
	Mar 13	Spring Break – No classes	
10	Mar 18	Addressing Modes and System Software	Ch. 2.12-2.13
	Mar 20	Floating Point Arithmetic	Ch. 3.5
11	Mar 25	File Input & Output	Slides
	Mar 27	Memory-Mapped I/O	Slides
12	Apr 1	Interrupts and Exceptions	Ch. 4.9, A.7
		Macros	Slides
	Apr 3	Test 2 Review	
13	Apr 8	Test 2 in the Testing Center	
	Apr 10	Processor: Datapath & Control	Ch. 4.5
14	Apr 15	Processor: Pipelining	Ch. 4.6-4.8

	Apr 17	Advanced Instruction Level Parallelism	Ch. 4.11
15	Apr 22	Introduction to memory hierarchy	Ch. 5.1-5.3
	Apr 24	Virtual memory	Ch. 5.4-5.7
16	Apr 29	Comparing ISAs	Ch. 2.16, 2.17, Slides
	May 1	Test Review	
	TBA	Test 3 in the testing center.	

Off-campus Instruction and Course Activities

Not Applicable.

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 see <http://go.utdallas.edu/academic-support-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.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.