



## **CSCI 450, 01B**

### **Computer Architecture**

COURSE SYLLABUS: Spring 2024

#### **INSTRUCTOR INFORMATION**

Instructor: Derek Harter, Ph.D., Professor  
Office Location: Science 355  
Office Hours: T, Th 8:00a – 9:00a, 2:00p – 3:30p (please e-mail for appointment)  
Class Meetings: T, Th 12:30 – 1:45p Jour 234  
University Email Address: [Derek.Harter@tamuc.edu](mailto:Derek.Harter@tamuc.edu)  
Preferred Form of Communication: e-mail (Please indicate the course number in the subject line)

#### **COURSE INFORMATION**

Materials – Textbooks, Readings, Supplementary Readings

##### **Required:**

Structured Computer Organization, 6<sup>th</sup> Edition, Andrew Tanenbaum and Todd Austin, Pearson, ISBN 9780132916523, 2013.

##### **Recommended:**

Computer Organization and Architecture, 11<sup>th</sup> Edition, William Stallings, ISBN-13: 9780134997193

Computer Systems Design and Architecture, 2nd edition, Vincent P. Heuring and Harry F. Jordan, ISBN:0-13-048440-7

##### **Software Required**

You will be given a virtual class development box for this class. You are required to have a computer with at least 4GB of memory, running Windows, MacOS or Linux

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operating systems. You will need to install git, Docker and VSCode software (see getting started instructions).

## **Course Description**

The class in general will cover how a program controls the very hardware that makes up a computer. Topics include Computer system performance metrics and analysis; instruction set design; CPU organization (datapath and control, out-of-order execution, register renaming, branch handling techniques, supporting precise interrupts in out-of-order pipelines, superscalar processors); memory systems (caches, virtual memory, TLBs, multi-level cache hierarchies, cache subsystem optimizations); input-output systems; storage systems and RAIDs; and introduction to multicore and multithreaded processors

Prerequisite: CSci 1437 (Programming Fundamentals II) and COSC 2325 (Machine Language and Digital Logic)

## **Student Learning Outcomes**

1. Students shall be able to understand the operations and timing issues of modern microprocessors, memory systems and input/output devices, and the interactions among these components.
2. Students shall be able to understand how hardware and software layers – such as the specific algorithm, programming language, compiler, instruction set architecture, and processor implementation – impact program performance.
3. Students shall be able to measure the performance of key processor features, such as caches and branch predictors.
4. Students shall be able to articulate a comprehensive view of architecture and performance for real-world computers.

## **COURSE REQUIREMENTS**

### **Minimal Technical Skills Needed**

Familiarity with word processing, familiarity with online D2L coursemanagement system, HLL Programming (C++, Matlab), Assembly programming (not a specific assembly language, but how to code in it!)

### **Instructional Methods**

All materials, assignments and tests will be conducted through the D2L MyLeo Online learning system. The course will consist of weekly readings and quizzes on the readings. Longer assignments will be assigned covering topics for the course. More comprehensive midterm and final exams will be given over the course materials.

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## **Student Responsibilities or Tips for Success in the Course**

To plan a minimum of three hours of outside preparation for each hour of class is a safe time allocation for successfully completing the course.

## **GRADING**

Final grades in this course will be based on the following scale:

A = 90%-100%

B = 80%-89%

C = 70%-79%

D = 60%-69%

F = 59% or Below

**Assignments:** There will be regularly assigned homework problems and programming problems. Assignments will be given and returned via the online MyLeo Online (D2L) system as a convenience to the students and the instructor. In general, we will probably have 1 written assignment (problem set) and/or 1 programming assignment for each of the major parts of the course. It is very important that students follow the instructions carefully on the assignments. It is the student's responsibility to have all assignments ready on time by the given due date. Late assignment may not be accepted or may be penalized and assignment may not be accepted beyond a certain time. Important material from the text and outside sources will be covered in class. Students should plan to take careful notes as not all material can be found in the texts or readings. Discussion is encouraged as student-procured outside material relevant to topics being covered. End of chapter activities and online activities may be assigned to reinforce material in the text.

### **Assessments**

Quizzes / Participation:	20%
Assignments:	40%
Midterm Exam:	20%
Final Exam:	20%

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## TECHNOLOGY REQUIREMENTS

### LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:

<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>

LMS Browser Support:

[https://documentation.brightspace.com/EN/brightspace/requirements/all/browser\\_support.htm](https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm)

YouSeeU Virtual Classroom Requirements:

<https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements>

## ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or [helpdesk@tamuc.edu](mailto:helpdesk@tamuc.edu).

**Note:** Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

## COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

### Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

<https://community.brightspace.com/support/s/contactsupport>

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## **Interaction with Instructor Statement**

Please use e-mail and through the MyLeoOnline course to ask questions and for help, and to set up additional appointments if needed. We may use some of the MyLeoOnline virtual classroom tools this semester for online class feedback sessions.

## **COURSE AND UNIVERSITY PROCEDURES/POLICIES**

### **Course Specific Procedures/Policies**

There will be no make up or extra credit for late assignments. You must turn in all assignments by the require due date, or notify the instructor with a valid reason for missing an assignment.

### **Syllabus Change Policy**

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

## **University Specific Procedures**

### **Student Conduct**

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the [Student Guidebook](http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx).  
<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx>

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum:  
<https://www.britannica.com/topic/netiquette>

### **TAMUC Attendance**

For more information about the attendance policy please visit the [Attendance](#) webpage and [Procedure 13.99.99.R0.01](#).  
<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf>

### **Academic Integrity**

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures/

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Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course. Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism). Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty

<https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

13.99.99.R0.10 Graduate Student Academic Dishonesty

<https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/graduate/13.99.99.R0.10.pdf>

### **Students with Disabilities-- ADA Statement**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

#### **Office of Student Disability Resources and Services**

Texas A&M University-Commerce

Gee Library- Room 162

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: [studentdisabilityservices@tamuc.edu](mailto:studentdisabilityservices@tamuc.edu)

Website: [Office of Student Disability Resources and Services](https://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/)

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

### **Nondiscrimination Notice**

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the

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basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

## **Campus Concealed Carry Statement**

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Web url:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

## **COURSE OUTLINE / CALENDAR (Tentative)**

Unit	Content	Reading
<b>Part 1 Introduction</b>		
U1	Basic Concepts and Computer Evolution, Number Systems	Syllabus, Ch 1, Ch 10
U2	Performance Concepts	Ch 2
<b>Part 2 The Computer System</b>		
U3	Computer Function and Interconnection	Ch 3
U4	Memory Hierarchy: Locality and Performance	Ch 4
U5	Cache Memory	Ch 5
U6	Internal Memory, External Memory	Ch 6, Ch 7
U7	Input/Output, Operating System Support	Ch 8, Ch 9
T1	Midterm Exam	-
<b>Part 3 Arithmetic and Logic</b>		
U8	Computer Arithmetic	Ch 11
U9	Digital Logic	Ch 12
<b>Part 4 Instruction Sets and Assembly Language</b>		
U10	Instruction Sets	Ch 13, Ch 14

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U11	Assembly Language	Ch 15
<b>Part 5</b>	<b>The Central Processing Unit</b>	
U12	Processor Structure and Function	Ch 16
U13	RISC	Ch 17
U14	Instruction-Level Parallelism and Superscalar Processors, Control Unit Operation	Ch 18, 19
T2	Final Exam	–

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