



## **CSCI, 450, 61E, Computer Architectures**

COURSE SYLLABUS: Spring 2024

### **INSTRUCTOR INFORMATION**

Instructor: Michael J. Henry

Office Location: RELLIS ACB106

Office Hours: by appointment

University Email Address: michael dot henry at tamuc dot edu

Preferred Form of Communication: **email**

Communication Response Time: 1 to 2 business days

### **COURSE INFORMATION**

#### Textbook(s) Required

- Andrew S. Tanenbaum and Todd Austin, "Structured Computer Organization", 6<sup>th</sup> Ed.

#### Software Required

- A working computer and a stable internet connection

### **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 (data path 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.

*The syllabus/schedule are subject to change.*

## **Student Learning Outcomes**

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

## **COURSE REQUIREMENTS**

### **Minimal Technical Skills Needed**

#### **PREREQUISITES:**

- COSC 1437 or COSC 1337 or CSCI 152, minimum grade C.
- COSC 2325 or CSCI 241, minimum grade C.

### **Instructional Methods**

During this course, we will use traditional and active learning methods, and work together using:

- In-class lectures using slides, supplementary materials, and hands-on exercises.
- Assignments that will be released via the Learning Management Systems (D2L).
- Individual / group projects: details of the project will be released during week 3.

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

1. It is expected that you are the owner of your success in this course, including ensuring you understand the expectations, timelines, policies and learning objectives.
2. Baseline expectations:
  1. Check LMS frequently.
  2. Follow the material in the textbook frequently, and use the slides as your guideline.
  3. Start your homework assignments early.
  4. Check the feedback on homework assignments.

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5. Do your work independently: collaboration and participation in study groups is encouraged to improve your understanding and to develop problem-solving strategies. However, cheating and plagiarism will not be tolerated, i.e. do not copy other people's work.
6. Communicate with the instructor when you are confused, or having difficulties with the course material / assignment / project.

## 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

## Assessments

| Assessments                | Assessment Type | Weight of Final Grade | Learning Objectives                           |
|----------------------------|-----------------|-----------------------|---|
| Assignments                |                 | 20%                   | Understanding of concepts and problem solving |
| Quizzes & Participation    |                 | 10%                   |   |
| Exam 1                     |                 | 25%                   |   |
| Exam 2                     |                 | 25%                   |   |
| Term Report & Presentation |                 | 20%                   |   |

## 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)

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Zoom Video Conferencing Tool

[https://inside.tamuc.edu/campuslife/CampusServices/CITESupportCenter/Zoom\\_Account.aspx?source=universalmenu](https://inside.tamuc.edu/campuslife/CampusServices/CITESupportCenter/Zoom_Account.aspx?source=universalmenu)

## 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>

### Interaction with Instructor Statement

To communicate with me about this course, kindly use the email address included in this syllabus. During the week, you can generally expect a response to your emails within 1-2 business days. *If you do not receive my response in 2 business days, please send a second email to me.*

To ensure I get your email and respond within indicated timelines above, please make sure that:

- Your email message is sent from your Texas A&M student account.
- Your email message includes a descriptive subject with the indicated prefix:

CSCI 450 – Spring 2024 -- <descriptive subject>

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

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

Students are expected to do the readings, attend class, and participate in class discussions. Each student is responsible for managing their own time and work-load. Emergency / extreme circumstances causing a student to miss deadlines/exams will need to be supported by official and university approved documentation.

### **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>

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 [Procedures 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:

[Undergraduate Academic Dishonesty 13.99.99.R0.03](#)

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### [Undergraduate Student Academic Dishonesty Form](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/documents/13.99.99.R0.03UndergraduateStudentAcademicDishonestyForm.pdf>

### [Graduate Student Academic Dishonesty Form](#)

<http://www.tamuc.edu/academics/graduateschool/faculty/GraduateStudentAcademicDishonestyFormold.pdf>

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.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

Velma K. Waters Library Rm 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](#)

<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 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

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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.

### **A&M-Commerce Supports Students' Mental Health**

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit [www.tamuc.edu/counsel](http://www.tamuc.edu/counsel)

### **AI use policy [Draft 2, May 25, 2023]**

**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**

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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**

**13.99.99.R0.10 Graduate Student Academic Dishonesty**

**Department or Accrediting Agency Required Content**

### **COURSE OUTLINE / CALENDAR**

| <b>Week</b>    | <b>Course Subject</b>   |
|----------------|---|
| Week 1         | Introduction  |
| Week 2         | Processors (instruction sets, registers, RISC and CISC)   |
| Week 3         | Processors (continued), primary memory and secondary memory                                       |
| Weeks 4-6      | Digital Logic (gates, ALU, flip-flops, memory)  |
| Week 7         | <b>Exam 1</b>   |
| Week 8         | Microarchitecture (data path, cache memory, register renaming)                                    |
| <b>Week 9</b>  | <b>Spring Break</b>   |
| Week 10        | Microarchitecture (continue)  |
| Week 11-12     | Instruction Set Architecture (ISA, data type, instruction format/types, addressing, control flow) |
| Week 13        | Operating System Machine  |
| Week 14        | Assembly Language   |
| Week 15        | Parallel Computer Architectures   |
| <b>Week 16</b> | <b>Project Due, Exam 2</b>  |

\*The schedule is **tentative** and may be adjusted to fit the actual class progress.

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