COURSE 540, 01W, Computer Architecture

COURSE SYLLABUS: Fall 2022

INSTRUCTOR INFORMATION

Instructor:	Dr. Kaoning Hu
Office Location:	JOUR 220
Office Hours:	M&W 10:00-12:00
	T&R 11:00-12:00
Office Phone:	903-886-5406
Office Fax:	903-886-5404
University Email Address:	kaoning.hu@tamuc.edu
Preferred Form of Communication**:**	Email
Communication Response Time:	1~2 business days

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Textbook recommended:

Andrew S. Tanenbaum and Todd Austin, "Structured Computer Organization", 6th Ed. PHI, 2013. (ISBN: 978-8120347205).

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. By the end of the class, students should know the inner construction of a computer, and how at power-up, a computer loads code into the processor, and begins performing work.

The *syllabus/schedule are subject to change.*

Student Learning Outcomes

1. Students shall be able to identify general purpose machines from different views, and classify computers and their instructions.
2. Students shall be able to identify cost and performance of a computer, evaluation metrics, Amdahl's law, principle of locality, and benchmark.
3. Students shall be able to identify cache and memory organization, cache mapping and replacement strategies, and virtual memory.
4. Students shall be able to identify Pipelining techniques, and pipelining performance issues, hazards and solutions.
5. Students shall be able to use I/O system technology: hard drive, RAID technology, I/O performance and benchmarks.
6. 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 D2L
- High Level Language Programming (E.g., C++)
- CSCI 516 (Assembly Language) Min Grade B

Instructional Methods

We will have weekly lectures. Slides, supplementary materials, and assignments will be released via D2L. *Please upload your assignments to the appropriate folders on D2L.*

Student Responsibilities or Tips for Success in the Course

1. Check D2L at least twice a week.
2. Read the textbook frequently, and use the slides as your guideline.
3. Start your homework assignments early.
4. Check the feedback of homework assignments.
5. Do your own work. If you have difficulties in an assignment, ask the instructor. Do not copy other people's work.
6. Contact the instructor when you are confused.

GRADING

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

A = 90%-100%

B = 80%-89%

C = 70%-79%

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D = 60%-69%

F = 59% or Below

Your weighted total grade will be computed using the following weights.

- Midterm and final exams: 50%
- Quizzes: 15%
- Assignments: 25%
- Term Report: 10%

Assessments

Assignments will be graded on the following:
- meet specification of assignment
- have good organization and logic
- demonstrate good form, including remarks and indentation
- on-time (Late submission subject to the penalty.)

Quizzes and exams are graded based on the correctness of the answers.

Exams are comprehensive unless otherwise specified. The study guide of each exam will be announced one week before the exam.

Quizzes are not comprehensive unless otherwise specified.

The number of assignments and quizzes are negotiable.

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

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**.**

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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 you are to use the email address on this syllabus. Please include the course number in the beginning of the subject field for every email message. During the week, you can generally expect a response to your emails within 1 business day. *If you do not receive my response in 2 business days, please send a second email to me*.
You can also call me at my office or stop by my office during office hours. You can also schedule an appointment by email.
My office location, phone number, and office hours are subject to change and amendment.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

Attendance is required but not graded. The student is responsible to manage their own time.
Late submission of assignment subject to the penalty: Up to 20% if no later than 7 calendar days; Up to 100% if later than 7 calendar days.
Make-up quizzes/exams are given only if there is an emergency. If you take a make-up quiz/exam, you may receive a different set of questions with approximately the same difficulty level as the regular quiz/exam. Alternatively, you may also choose to receive a grade based on your in-class ranking in the next quiz/exam.
Extra credit may be possible.

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.

The *syllabus/schedule are subject to change.*

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

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 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:

Undergraduate Academic Dishonesty 13.99.99.R0.03
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

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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

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 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.

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A&M-Commerce Supports Students' Mental Health

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COURSE OUTLINE / CALENDAR

Week 1	Introduction
Week 2	Processors (instruction sets, registers, RISC and CISC)
Week 3	Processors (continued), primary memory and secondary memory
Week 4	Digital Logic (gates, ALU, flip-flops)
Week 5	Digital Logic (continued)
Week 6	Digital Logic (continued)
Week 7	Digital Logic and Microarchitecture
Week 8	Midterm exam
Week 9	Microarchitecture (data path, cache memory, register renaming)
Week 10	Microarchitecture (continued)
Week 11	Microarchitecture (continued)
Week 12	Operating System Machine (virtual memory, paging, segmentation)
Week 13	Operating System Machine (continued)
Week 14	Assembly Language
Week 15	Parallel Computer Architecture, term project presentation
Week 16	Final exam, term report due

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

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