

Midwestern State University
Department of Computer Science
Fall 2020

Course Information

Course syllabus: Advanced Computer Architecture.

Course number: CMPS 5133.

Course Section: 101.

Class hours: 2:00 pm to 3:20 pm, Tuesday and Thursdays.

Class room: Bolin 320.

Instructor Information

Instructor's Name: Doctor Eduardo Colmenares.

Instructor's office: Bolin Hall, office 126C.

Instructor's email: eduardo.colmenares@msutexas.edu

Office Hours

All office hours will be virtual via zoom.

Monday and Wednesday: 1 pm to 2 pm.

Tuesday and Thursday: 3:30 pm to 4:30 pm.

Friday: 9 am to 10 am.

ZOOM information

[Zoom Link](#)

Course Description

A study of the organization and interconnection of components of computer system. Emphasis is given to the study of the instruction set and performance analysis of different computer architectures. Also included is the study of pipeline, overlap processing, memory management, virtual memory, parallel many and multicore architectures, as well as novel up to date architectures.

Textbook

Is the textbook required? Strongly Recommended.

Textbook name: Computer Organization & Architecture: Designing for performance

Textbook edition: The most recent one.

Textbook Author: William Stallings.

Publisher: Prentice Hall.

Additional References (Not Required)

- Modern Processor Design. By J.P. Shen and M.H. Lipasti (1st Edition)
- Computer Architecture a quantitative Approach – by John Hennessy and David Patterson. Publisher: Morgan Kaufmann.

Required Hardware

- Regular traditional PC/Mac. Chromebooks are NOT allowed since they do not work really well with D2L.
- Printer and Paper

Scanning Capabilities

Students are required to have scanning capabilities from day one until the end of the semester. The scanning of documents will play a critical part in our tests, final exam, homeworks and quizzes. If you have a smartphone you can take advantage of free scanner apps. Please download the one of your choice and familiarize with it ahead of time.

Evaluation Process

The final grade for this course will be based on participation, projects and exams. A description is provided below:

- You will have two tests (T1 and T2), plus one final exam (FE). T1 is worth 23 percent, T2 is worth 23 percent and your final exam is worth 22 percent.
- You will have several assignments, these will count for 22 percent of final your grade.
- The last category is participation, and this will count for ten percent of your final grade. Please be aware that this category includes in class activities and quizzes. Below you will find additional information about this category.
 - Assignments given in class, also known as in class activities will be unannounced in nature.
 - Quizzes will be non-pop-up quizzes. There are three potential formats for our Quizzes, the instructor decides which format to use and when.
 - Format 1 (online quizzes): if this option is used then you are required to use D2L to take the quiz, you cannot use a Chromebook for this purpose, and you should have
 - Format 2 (online but by hand): You will be required to print the document and scan it.
 - Format 3: Traditional in class hard copy.
 - No makeup participation assignments are given.
 - Arriving late, leaving early to class voids the right to take a quiz or in class activity if it already started or it is about to start.

Evaluation Process Summary Table

| Category | Percentage |
|-------------------------|------------|
| Two Tests | 46% |
| Final Exam | 22% |
| Assignments | 22% |
| Participation (Quizzes) | 10% |

Grading Policy

89 to 100 points is an A.

79 to 88.99 points is a B.

69 to 78.99 points is a C.

59 to 68.99 points is a D.

0 to 58.99 points is an F.

Attendance

Attendance is NOT a component of the course grade; however, the student will be subject to any attendance associated requirement as specified/required/stipulated by the University.

The student is responsible for covering any missed lecture unless proper medical documentation is presented to the instructor on time.

Laptop Policy

For this class, you are not required to buy a laptop. However, if the instructor announces an (In Class Homework (ICH) or In Class Activity (ICA), then you are responsible for the following:

- Bringing a laptop with all necessary programs properly installed, configured and tested.
- Bringing the laptop's charger: If you do not bring your charger and cannot complete the assignment(s) because your battery died, then your grade will not be a good one.
- Make sure that you have a fully working and in-classroom tested Wi-Fi capabilities. If you cannot submit your homework because your Wi-Fi does not work, then your grade will not be a good one.

Tests

Tests are comprehensive in nature. No make-up exams will be given, except for the following cases:

1. Surgery, Medical Emergency, Death in the family, Presentation at a Conference, some others as determined by the instructor.
 - a. If you miss an exam, you will receive a permanent zero unless you notify the instructor and demonstrate with the proper official documentation that an emergency that you could not circumvent existed. This documentation must be presented not later than 24 hours after the test.
 - b. Students who miss an exam due to University business should notify the instructor in advance, and present the sponsoring university member's written justification.

If you do miss an exam and your case fall in one of the categories above (a), (b), this means that you have a properly documented case. Your instructor will proceed to assign a temporary grade of zero which will be substituted for your excused test grade (Final Exam). However, this substitution can only be performed once during the semester. Exams are uniquely composed for each term.

Final Exam

- There is no make-up final exam. The final exam will take place in our regular classroom. It is the student's responsibility to keep track of the designated date, time. A complete list of all MSU exams (by time) can be found at [Final Exam Schedule](#).
- The date of our final exam is Thursday December the 10th, from 1:00 pm to 3:00 pm.
- For the final exam students are required have scanner like capabilities. Please prepare well ahead of time, setup your system and have it ready to be used.
- If you have a smartphone you can take advantage of free scanner apps. Please download the one of your choice and familiarize with it ahead of time.

Late Policy & Deadlines

- Submitted work is due when specified, as specified (format) by the instructor. It is in the student's best interest to keep track of all deadlines.
- The instructor is not required to remind students of ANY date and/or deadline associated with tests, homework, reports, project assignment, etc.
- Assignments submitted to the instructor's email will be considered invalid, even if submitted before the deadline. Assignments MUST be submitted to the corresponding dropbox via D2L.
- Late assignments will not be accepted.
- Very Important: Before you submit any file, take your time and double OR triple check that

- a. You are uploading the correct and ALL necessary files
 - b. Your work is correct at the best of your abilities
 - c. Failure to fulfill (1) and (2) ON TIME, WILL NOT excuse you from a bad grade.
- What does it mean to be late?
Answer: for example, if your assignment is due today at 8:00 am and you deliver your report by 8:00:01 am (1 second late) then it will be considered late. There will not be exemptions of any kind.

Additional Grade Policy

Once the grades, have been either returned to the students, or published via D2L, the student will have one week to examine them, and check for inconsistencies, errors, etc. After the 1-week window of opportunity all grades will become PERMANENT and WILL NOT change. It is not only the student's responsibility to check the accuracy of his/her grades, but also in his/her best interest to do it. This rule DOES NOT apply to the final exam because the final is exam triple checked by the instructor before publishing the grade.

Important Information about our grading policy

The instructor reserves the right to adjust the grade distributions for the whole class. What does it mean? It means that grade distributions will not be adjusted on an individual basis.

Departmental Cheating Policy and Ethical Conduct

Policy on Academic Honesty

The Department of Computer Science had adopted the following policy related to cheating (academic misconduct). The policy will be applied to all instances of cheating on assignments and exams as determined by the instructor of the course. (See below for link to MSU definitions.)

- 1st instance of cheating in a course: The student will be assigned a non-replaceable grade of zero for the assignment, project or exam. In addition, the student will receive a one letter grade reduction in course.
- 2nd instance of cheating in a course: The student will receive a grade of F in course & immediately be removed from course.
- All instances of cheating will be reported to the Department Chair and, in the case of graduate students, to the Department Graduate Coordinator.

Policy on Testing Process

The Department of Computer Science has adopted the following policy related to testing.

1. All bags, purses, electronics (turned off), books, etc. will be placed in the front of the room during exams, or in an area designated by the instructor.
2. Unless otherwise announced by the instructor, nothing is allowed on the desk but pen/pencil/eraser and test papers.
3. No student is allowed to leave the room during an exam and return. Be prepared to remain in the classroom for the entire duration of the test.

Classroom Civility

All violations of classroom civility will be reported to the Dean of Students. Students are expected to assist in maintaining a classroom environment that is conducive to learning." In

order to ensure that all students gain from time spent in class, students are prohibited from engaging in any form of distraction, e.g. leaving the room for extended periods of time, reading newspapers (or other articles), working on other courses, and using cell-phones or laptops for calls or messages. If you indulge in any such inappropriate behavior (without explicit consent of the instructor), you will (at the very least) be asked to leave the classroom. [MSU Dean of Students Website](#).

Student with Disabilities

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from disability support office during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Disability Support Office has been provided. For additional information you may contact the Disability Support Office in Clark Student Center 168 - Phone: (940) 397-4140.

[Disability Support Services Website](#).

Dean of Students

The Dean of Students can assist in notifying the campus community of student illnesses, immediate family deaths and/or student death. Generally, in cases of student illness or immediate family deaths, the notification to the appropriate campus community members occur when a student is absent from class for four consecutive days with appropriate verification. It is the student's responsibility for missed class assignments and/or course work during their absence. [MSU Dean of Students Website](#).

RECORDING OF CLASS LECTURES

Permission must be requested in writing & obtained from the instructor before recording of class lectures. If permission is granted, the recording may only be used by the student making the recording. Recordings may NOT be posted on any internet source without written permission of the instructor. Failure to adhere to the policy may result in removal from the course with a grade of F or other appropriate punishment.

University's Campus Carry

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at [Campus Carry](#).

University COVID-19 Policy

All members of the MSU Texas Community (students, faculty, staff, visitors, vendors and contractors) are required to wear protective face coverings on campus or in University facilities as provided below:

- I. Requirements
 - a. In common areas on campus including, but not limited to, classrooms and other spaces used for teaching, research, and creative activity, student center, library, hallways, elevators, stairwells, restrooms, break rooms, foyers, event rooms and lobbies;

- b. Other areas where physical distancing of at least 6 feet is not maintained. Even when physical distancing of at least 6 feet can be maintained, face coverings are strongly recommended.
- II. Exceptions
 - a. When eating or drinking, which should still be conducted maintaining physical distance;
 - b. In accordance with applicable law (e.g., an accommodation, including for medical reasons, under the Americans with Disabilities Act (ADA), or pursuant to a bona fide religious belief)
 - c. For children under the age of 2 years old; or
 - d. By an instructor/presenter in a classroom or event room when a physical distance of at least 10 feet can be maintained from the class members/audience

Additional COVID 19-Policy

In order to protect your wellbeing and the one of those that you care about, the following preventive measurements will take place:

- a) Office hours will be virtual via ZOOM. Check your syllabus for detailed office hours.
- b) Your instructor will not touch any computer or USB Drive. NO Exemptions.
- c) If at some point you need/want me to look at your programming assignment or class project, you can do it by sharing your desk via ZOOM (Virtually) during office hours.
- d) Questions associated with ADVISING, degree plans, etc., will be addressed (Virtually-ZOOM) during office hours.

Tentative Agenda

The instructor reserves the right to add, remove, reorder topics as he considered convenient towards the benefit of the class.

1. Syllabus, Floating point numbers, IEEE 754
2. Instruction Sets: Types of {Operands and Operations}
3. Instruction Sets: {Addressing Modes and Formats}
4. (RISC vs CISC) & (Processor Organization)
5. (Register Organization) & (Instruction Cycle)
6. Pipelining Introduction and Fundamentals
7. Pipeline Hazards P1
8. Pipeline Hazards P2
9. Cache memories Intro, write policies
10. Memory Management
11. Memory Management
12. MM-Virtual Memory
13. VM-Page Tables
14. Page Tables
15. Input/Output Systems
16. Instruction Level Parallelism
17. Superscalar
18. Branch prediction
19. Data Dependencies
20. Tomasulo Algorithm

21. Posix Threads
22. Parallel processing, SIMD instructions, Heterogenous Multicore Processors
23. Cell Processor, GPU Architecture
24. Contemporary architectures
 - a. Quantum
 - b. GPU Architecture, programming