

**MIDWESTERN STATE UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE**  
*CMPS 4453: Computer Architecture*  
*Fall semester 2023*

Instructor: Dr. Nelson L. Passos  
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Office Hours: MW 9:00 - 11:30 am  
TR 9:30 - 11:30 am  
T 2:00 - 4:00 pm  
Class Hours: MWF 8:00 - BO 320

**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 microprogramming, pipeline, overlap processing, superscalar, parallel and massively parallel architectures. Current trends in computer design are also discussed.

**Prerequisites:**

Minimum grade of C in CMPS 1043

**Text book:**

Computer Organization and Architecture, by Stallings (10<sup>th</sup>/11<sup>th</sup> edition).

Tests and Final Exam:	20 % (each, include lecture and lab material)
Assignments:	20 % (include lecture and lab material)
Programming project:	15 %
Class Participation:	5 %

**Final grading letter:**

90 to 100 pts = A, 80 to 89.99 pts = B, 70 to 79.99 pts = C, 60 to 69.99 pts = D, other = F

**Additional and important information:**

*All students should refer to the current MSU Students Handbook and Activities Calendar for university policies related to class attendance, academic dishonesty, students responsibilities, rights and activities.*

**Disability needs:** Inform the instructor if you are a student with a disability and need accommodations for this class.

**Cell phones, etc.:** Use of any electronic device is not allowed in the classroom. Exceptions must be approved by the instructor.

**Student drops:** If you wish to drop this course you must first contact your instructor. All students-initiated drops must be processed by **October 30, 2023**.

**Attendance:** Students are expected to attend all meetings of the classes in which they are enrolled. Attendance is rewarded by the participation points in the grading criteria.

**Campus Carry:** Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. The new Constitutional Carry law does not change this process. Concealed carry still requires a License to Carry permit, and openly carrying handguns is not allowed on college campuses. For more information, visit [Campus Carry](#).

**Active Shooter:** The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by MSU Police Department regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit [Safety / Emergency Procedures](#). Students are encouraged to watch the video entitled "Run. Hide. Fight." which may be electronically accessed via the University police department's webpage: ["Run. Hide. Fight."](#)

**Assignments:** Assignments will be made as scheduled and are expected to be completed by the specified due date. Grades will be given to the assignments handed in on time. Late assignments will be accepted until one class past the due date (except for online assignments), however will have their maximum grade reduced by twenty points. Any assignment turned in after that period or not done will be graded zero points. Students in this course must demonstrate their competency in fundamentals math skills through assignments and tests.

**Assistance:** Please contact your instructor for extra help during this course. This includes class material clarification, expected absences from class due to any personal problem, etc.

**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.

- 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. The MCOSME website provides information on the process for grade appeals or appeals of academic honesty sanctions. The Grade Appeal Checklist provides the timeline for appealing from the instructor to the next in line (dean of the college). The Academic Honesty Checklist describes the timeline for appealing from the instructor to the next in line (chair of department).

**Testing Process:** The Department of Computer Science has adopted the following policy related to testing:

- 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.
- Unless otherwise announced by the instructor, nothing is allowed on the desk but pen/pencil/eraser and test papers.
- No student is allowed to leave the room during an exam and return

**Midterm Progress Report:** In order to help students keep track of their progress toward course objectives, the instructor for this class will provide a Midterm Progress Report through each student's WebWorld account. Midterm grades will not be reported on the students' transcript; nor will they be calculated in the cumulative GPA. They simply give students an idea of where they stand r. Students earning below a C at the midway point should schedule a meeting with their instructor.

**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.

**Grading system will be discussed in class.**

## Tentative agenda:

Aug 28-	Cache memory
Aug 30-	In class evaluation Quiz (review)
Sep 1-	Replacement algorithms
Sep 4-	<b>Labor Day Holiday</b>
Sep 6-	Cache coherence
Sep 8-	Multi-level cache
Sep 11-	Memory management
Sep 13-	Paging/ Segmentation
Sep 15-	TLB- <b>assignment # 1</b>
Sep 18-	Paging/ Segmentation
Sep 20-	Intel/ARM address translation
Sep 22-	Computer arithmetic – integer operations - <b>assignment # 2</b>
Sep 25-	Booth's algorithm – floating point representation
Sep 27-	Floating point representation
Sep 29-	Floating point operations - <b>assignment # 3</b>
Oct 2-	Processor – register organization
Oct 4-	Instruction cycle
Oct 6-	<b>Test # 1</b>
Oct 9-	Test review -
Oct 11-	Interrupts
Oct 13-	Pipeline hazards
Oct 16-	Branch prediction
Oct 18-	Intel/ARM examples
Oct 20-	Superscalar processors
Oct 23-	Instruction level parallelism
Oct 25-	Register renaming
Oct 27-	Instruction sets – types of operands- <b>assignment # 4</b>
Oct 30-	Types of instructions
Nov 1-	Common instructions
Nov 3-	MMX – byte ordering
Nov 6-	Addressing modes
Nov 8-	Instruction format
Nov 10-	Assembly language- <b>assignment # 5</b>
Nov 13-	Assembly language
Nov 15-	Types of Assembler
Nov 17-	RISC - characteristics
Nov 20-	RISC – register file
Nov 22-	<b>Thanksgiving Break</b>
Nov 24-	<b>Thanksgiving Break</b>
Nov 27-	RISC - optimization
Nov 29-	Control unit – micro-operations
Dec 1-	<b>Test # 2</b>
Dec 4-	Micro-instructions
Dec 6-	Parallel processing/ Multithreading/ Clusters
Dec 8-	Parallel processing/ Multithreading/ Clusters
Dec 13-	<b>Finals (Wednesday, 8:00 am)</b>