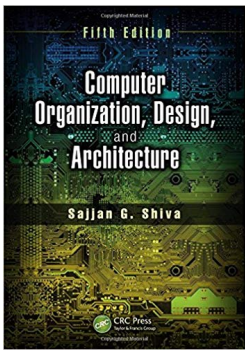
CpE5110/CS5700
Principles of Computer Architecture



Instructor: A. R. Hurson hurson@mst.edu
Office: 128 EECH Building
Office Hours: M, W, F 10:00 – 11:00

Text: Computer Organization, Design, and Architecture, 5th edition (Shiva)
Reference: *Introduction to Arithmetic for Digital Systems (Waser & Flynn)*
All course materials will be available on Canvas

Outline:

1. Performance measures	Module 1
2. High Speed Arithmetic Techniques a. Fast Add/Subtractor b. Fast Multiplier/Divider	Module 2
3. Memory Hierarchy, Organization and Design a. Virtual Memory b. Cache Memory c. Interleaved Memory d. Associative Memory	Module 3 & 4
4. Input-Output Organization and Design a. I/O Channels b. I/O Processors	Module 3 & 4
5. Study of Advanced Processor Features a. Uniprocessor (RISC, CISC) b. Stack Machines c. Pipelining and Pipeline Design d. Fine Grain Parallelism	Module 5
6. Instruction Level Parallelism	Module 6
7. Study of a multifunctional system	Module 5
8. How to break RISC barrier/superscalar/VLIW/super pipeline	Module 6
9. Study of Pentium/Power PC/Multicore architecture	Module 6

Administrative (no make up exam)

*	8 Home-works	10%	
*	Project	10%	
*	Periodic Exams and quizzes	50%	
*	Final Exam	30%	(Comprehensive)

Course Policies:

- **Attendance**
  - Class attendance is highly recommended

- **Makeup examinations & Extensions**
  - There will be no makeup exams/quizzes (except for documented medical reason and highly unusual unexpected events).

- **Exams**
  - There will be one exam for each course module during the semester and one comprehensive final exam during final exams week.

- **Submission Guidelines**
  - Hardcopy of homework assignments and project(s) are collected in class, at the beginning

  - It is encouraged to work as a group (at most two people per group) on homework assignments/project (grouping is fixed throughout the semester).

Tentative course schedule CpE5110/CS5700

Major Topic	Related Text Chapter	Class notes	Date
Performance measures	Chapter 16	Module 1, page 1-25	January 22
Amdahl's law		Module 1, page 26-45	January 24
Practice session Module1, Modular ALU	Chapter 10	Module 2, page 1-15	January 27
Fast addition		Module 2, page 16-26	January 29
Test Module 1, Multiplication		Module 2, page 27-34	January 31
Fast multiplication		Module 2, page 35-44	February3
Division		Module 2, page 45-54	February 5
Fast division methods		Module 2, page 55-64	February 7
		Module 2, page 65-77	February 10
Practice session Module2			February 12
Practice session Module2			February 14
Test Module 2, Memory	Chapter 9	Module 3, page 1-13	February 17
Address accessible memory		Module 3, page 14-26	February 19
Interleaved memory		Module 3, page 27-40	February 21
		Module 3, page 41-54	February 24
Locality		Module 3, page 55-61	February 26
Cache		Module 3, page 62-78	February 28
Address mapping		Module 3, page 96-107	March 2
Virtual memory		Module 3, page 108-122	March 4
Segmentation and Paging		Module 3, page 123-134	March 6

Practice session Module3			March 9
Test Module 3, Content addressable memory		Module 4, page 1-12	March 11
No class Spring Recess			March 13
		Module 4, page 13-38	March 16
Practice session Module4			March 18
Test Module 4			March 20
Concurrency	Chapters 11 & 12	Module 5, page 1-21	March 30
Multifunctional system		Module 5, page 22-38	April 1
Classification		Module 5, page 39-56	April 3
Computation Gap		Module 5, page 57-71	April 6
Pipelining		Module 5, page 72-87	April 8
Parallelism		Module 5, page 88-101	April 10
Multiprocessing		Module 5, page 102-118	April 13
		Module 5page 119-129	April 15
Practice session Module5		Module 5, page 130-133	April 17
Test Module 5, Beyond RISC		Module 6, page 1-14	April 20
Out-of-order execution/		Module 6, page 15-28	April 22
VLIW		Module 6, page 29-42	April 24
Superscalar		Module 6, page 43-56	April 27
Superpipeline		Module 6, page 57-70	April 29
		Module 6, page 71-88	May 1
		Module 6, page 71-88	May 4
		Module 6, page 71-113	May 6
Catch up			May 8

University Policies

- **Academic Alert System** http://academicalert.mst.edu

The purpose of the Academic Alert System is to improve the overall academic success of students by improving communication among students, instructors and advisors; reducing the time required for students to be informed of their academic status; and informing students of actions necessary by them in order to meet the academic requirements in their courses.

- **Disabilities** http://dss.mst.edu

If you have a documented disability and anticipate needing accommodations in this course, you are strongly encouraged to meet with the instructor as early as possible in the semester. You will need to request that the Disability Support Services staff send a letter to the instructor verifying your disability and specifying the accommodation you will need before the instructor can arrange your accommodation. Disability Support Services is located in 204 Norwood Hall, their phone number is 341-4211, and their E-mail is
dss@mst.edu.

- **A Student Honor Code and Academic Integrity**

The Honor Code can be found at this link: http://stuco.mst.edu/about/honor.shtml. Please read and reflect upon the Honor code and its emphasis on HONESTY and RESPECT.
Page 30 of the Student Academic Regulations handbook describes the student standard of conduct relative to the University of Missouri System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism or sabotage (http://registrar.mst.edu/academicregs/index.html).
Incidences of Academic Dishonesty will typically result in zero grades for the respective course components, notification of the student's advisor, the student's department chair, and the campus undergraduate studies office, and further academic sanctions may be imposed as well in accordance with the regulations. Note that those who allow others to copy their work are just as guilty of plagiarism and will be treated in the same manner.

- **S&Tconnect**: https://blackboard.mst.edu/ (S&Tconnect tab)

Coming fall 2014, Missouri S&T is implementing a new advising system as part of the four UM campuses Comprehensive Retention Initiative called S&Tconnect. S&Tconnect provides an enhanced system that allows students to request appointments with their instructors and advisors via the S&Tconnect calendar, which syncs with the faculty or staff member's Outlook Exchange calendar. S&Tconnect will also facilitate better communication overall to help build student academic success and increase studentretention. S&Tconnect Early Alert will replace the Academic Alert system used by Missouri S&T. However, Academic Alert will continue to run in parallel with Early Alert until the end of the fall 2014 semester. Training will be provided beginning opening week of fall 2014 semester.

- **Classroom Egress Maps:**

Please familiarize yourself with the classroom egress maps posted on-line at: http://registrar.mst.edu/links/egress/.

- **LEAD Learning Assistance** http://lead.mst.edu

The Learning Enhancement Across Disciplines Program (LEAD) sponsors free learning assistance in a wide range of courses for students who wish to increase their understanding, improve their skills, and validate their mastery of concepts and content in order to achieve their full potential. LEAD assistance starts no later than the third week of classes. Check out the online schedule at http://lead.mst.edu/assist, using zoom buttons to enlarge the view. Look to see what courses you are taking have collaborative LEAD learning centers (bottom half of schedule) and/or Individualized LEAD tutoring (top half of the schedule). For more information, contact the LEAD office at 341-7276 or email lead@mst.edu.

- **The Burns & McDonnell Student Success Center**

The Student Success Center is a centralized location designed for students to visit and feel comfortable about utilizing the campus resources available. The Student Success Center was developed as a campus wide initiative to foster a sense of responsibility and self-directedness to all S&T students by providing peer mentors, caring staff, and approachable faculty and administrators who are student centered and supportive of student success. Visit the B&MSSC at 198 Toomey Hall; 573-341-7596; success@mst.edu; facebook: www.facebook.com/mstssc; web: www.studentsuccess.com.