CMPS 402: Computer Organization (3 credit hours) - Spring Semester

Instructor: Dr. Shizhong Yang
Office: E113 Thurman Hall
Office Hours: TueThr: 7:30 AM – 11:00 AM or by appointment.
Class Room: N205 Thurman
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Required Textbook:

John Hennessy and David Patterson, **Computer Architecture – A Quantitative Approach**, 6th Edition. ISBN-13: 978-0-12-8119051, Morgan Kaufmann, Nov. 23, 2017, 936 page count, Important References

William Stallings, Computer Organization and Architecture - Designing for Performance, 9th Edition. ISBN-13: 978-0-13-293633-0

Linda Null and Julia Lobur, The Essentials of Computer Organization and Architecture, 3rd Edition. ISBN 13: 978-1-4496-0006-8

ABET Learning Outcomes:

a. An ability to apply knowledge of computing and mathematics appropriate to the discipline

Course Objectives:

The objectives of this course are to cover:
Study of the organization of various modern digital computers including both hardware and software requirements; topics in quantitative design and analysis, memory hierarchy design, parallelism, and domain specific architecture will be included. Prerequisite: knowledge of Discrete Structure and Computer Organization or Computer Architecture.

Course Learning Outcomes:

Upon completion of this course, students will be able to:
1. demonstrate the ability to identify the basic computer architecture components such as control unit, arithmetic and logical unit, memory unit and I/O units.
2. demonstrate the ability to identify the duties of central processing unit with regard to data representation, fixed point numbers, and computer arithmetic as well as the structure of memory hierarchy and system design including RAM, ROM, cache and virtual memories.
3. demonstrate the ability to identify the input and output organization with regard to external devices, I/O modules, I/O communication methods: programmed I/O, interrupt-driven I/O, and direct memory access.

Course Educational Strategies:

1. Provide clear lectures and discussions of appropriate computer architecture concepts.
2. Provide students with the opportunity to learn course material through reading and homework assignments.

3. Allow students to demonstrate mastery of the course concepts through submitted exercises such as exams and homework problems.
4. Provide students with the opportunity to learn more about the components of computer architecture through understanding their tasks and procedure in computer organization.

Course Topics:

1. Fundamentals of Quantitative Design and Analysis
2. Memory Hierarchy Design
3. Instruction-Level Parallelism
4. Data-Level Parallelism in Vector, SIMD, and GPU
5. Multiprocessors and Thread-Level Parallelism
6. Warehouse-Scale Computer
7. Domain Specific Architectures

Grading Distribution:

A student's grade at the end of the semester will be determined by following percentages:
Class participation/Activities 10%
Assignments/Projects 10%
Midterm 40%
Final 40%

Grading Scale:

Course grades at the end of the semester will be given based upon performance using the standard grading scale:
90– 100% A
80 – 89% B
70 – 79% C
60 – 69% D
Below 60% F