Course Outline

1. Document Information

Degree Program	Computer Science
Course Number	CS 401
Course Title	Computer Architecture
Semester Hours	3
Course Coordinator	Koushik Sinha
Revision Term	Spring 2020
Latest Revision	Fall 2020

2. Catalog Description

Review of logical circuit design. Hardware description languages. Algorithms for high-speed addition, multiplication and division. Pipelined arithmetic. Implementation and control issues using PLA's and microprogramming control. Cache and main memory design. Input/Output. Introduction to interconnection networks and multiprocessor organization.

3. Textbooks

- Hennessy, J. L. (2017). *Computer Architecture: A Quantitative Approach*. Elsevier, 6th Edition. ISBN:9780128119051.

4. References

5. Course Learning Outcomes

- To understand the concepts in computer organization and architecture.
- To learn to design processors, control, memory, and I/O sections.
- To learn the basic concept and design of multiprocessor systems.

6. Assessment of the Contribution to Student Outcomes

Outcome	1	2	3	4	5	6
Assessed		X				X

7. Prerequisites by Topic

CS 320 with a grade of *C* or better or graduate standing.

8. Major Topics Covered in the Course

1. Evolution and taxonomies of Computer Architecture, review of I/O interface {4 classes}
2. Processor design, microprogramming, instruction formats, number representations, design of advance and high speed arithmetic circuits, addition and subtraction, multiplication, division, pipelined arithmetic {10 classes}
3. Memory organization: semiconductor memories, associative memories, cache memories, parallel memories {4 classes}
4. Pipelines: instruction, arithmetic, static and dynamic pipeline designs, structural, data, and control hazards {12 classes}
5. CISC/RISC features {4 classes}
6. Interconnection networks: non-blocking, blocking, rearrangeable networks {6 classes}
7. Parallel computers: multiprocessors and multicomputers, cache coherence {6 classes}