

Course number and name: **CS 06310: Principles of Digital Computers**
Credits and contact hours: 3 credits. / 3 contact hours
Faculty Coordinator:
Text book, title, author, and year: Logic and Computer Design Fundamentals, 5th edition, M. Morris R. Mano, Charles R. Kime, Tom Martin, 2015.

Specific course information

Catalog description: This course provides an introduction to the fundamentals of computer hardware systems. The topics include digital logic, combinational circuits, sequential circuits, memory system structure, bus and interconnection structure, computer arithmetic and the ALU unit, I/O system structure, hardwired control unit, microprogrammed control unit, and alternative computer architectures.

Prerequisites: CS 06205: Computer Organization

Type of Course: Required Elective Selected Elective

Specific goals for the course

1. **combinational circuit design.** Students have designed and optimized combinational circuits and have demonstrated understanding of common combinational circuit components such as decoders, multiplexers, and adder-subtractors.
 - ABET (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
2. **sequential circuit analysis and design.** Students have analyzed and designed sequential circuits and demonstrated understanding of common sequential circuit components such as registers and counters.
 - ABET (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
3. **memory.** Students have demonstrated understanding of memory circuits and memory systems

- ABET (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
4. **computer design.** Students have demonstrated understanding of CPU operation and structure and have examined both single-cycle and multi-cycle designs.
- ABET (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs

Required list of topics to be covered

1. Binary logic and gates
2. Boolean algebra and circuit optimization
3. Design Procedure
4. Decoding, selecting, and binary adder-subtractors
5. Latches and Flip-Flops
6. Sequential circuit analysis
7. Registers and counters
8. RAM integrated circuits and array of RAM ICs
9. Datapaths and ALU
10. Instruction set architecture
11. Single-Cycle hardwired control
12. Multiple-Cycle hardwired control

Optional list of topics that could be covered

13. RISC and CISC processors
14. Pipeline design