

UPDATED: May 8th, 2009

ITI 1100 DIGITAL SYSTEMS I (May 4 - July 17)

LECTURES: Tuesday 15:00-17:00; STE 2060
Friday 09:30-11:30; STE 2060

LABORATORY: Monday, 17:30 - 20:30; CBY B302

* *Students must attend all lectures and all laboratory groups*

Description

Digital computers and information. Number systems and alphanumeric codes. Binary arithmetic. Boolean algebra. Logic functions representation, minimization and realization. Analysis, design and implementation of combinational circuits. Basic sequential circuits. Latches and flip-flops. Analysis and design of simple sequential circuits. Registers and counters. Implementation of digital circuits.

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Course organization:

- **Digital computers and information.**
- **Number systems and alphanumeric codes.** Binary, octal, hexadecimal, and BCD number representations. Signed binary numbers. Complements Binary number storage and registers. Binary arithmetic.
- **Boolean algebra.** Boolean functions. Canonical and standard forms. Other logic operations. Digital logic circuits.
- **Logic circuit minimization.** The map method. Product of sums simplification. Don't care conditions. NAND and NOR implementation. Other two level implementations. Exclusive OR function.
- **Combinational logic circuits.** Combinational circuit analysis. Design procedures. Representative combinatorial circuits: binary adder/subtractor, magnitude comparator, decoders, encoders, multiplexers.
- **Sequential logic circuits.** Binary memory circuits: latches and flip-flops. Synchronous sequential circuits. Design procedures. Asynchronous sequential circuits. N-state latches. Priority arbiters.
- **Registers and counters.** Shift registers. Ripple counters. Synchronous counters. Other counters.
- **State machines.** Moore and Milley finite state machines.
- **Review**

Marking Scheme

- Assignments 10%
- Laboratories 15%
- Mid term exam 25%
- Final exam 50%

Laboratory

Each student will have a laboratory session every week (exact schedule will be provided in the class). There are six experiments to be performed, each requiring a group preparation and completion report.

Laboratory groups will consist of three students only. Students are required to stay in the same group and with the same TA for the whole semester. Every group performing the experiment is required to record their data on paper and this should be seen and signed by the TA. The data should be attached to the submitted report. One lab report is expected from each group after each lab. The lab report should be prepared according to the guidelines specified in the lab manual.

Useful reading

M. Morris Mano, Michael D. Ciletti, Digital Design (Fourth edition), Prentice Hall, 2006.