

SUNY Geneseo, Department of Physics and Astronomy

CSCI 230: Digital Electronics

Syllabus, Spring 2007

Dr. James McLean

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Lab Instructor

Dr. Ed Pogozielski

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Course Description and Learning Outcomes:

This course has no prerequisites. No prior experience with circuits is required. At the end of this course, you will be able to use standard digital components to solve practical problems.

The laboratory experience is a very important part of the course; you will probably spend half or more of your time designing and implementing actual circuits. Lecture topics will include the differences between digital and analog circuits, numbering systems, Boolean logic and Boolean algebra, flip-flops and latches, and digital counters.

Note that the Lab portion of this course is managed by Dr. Pogozielski. He is completely in charge of that part of the course, including assigning grades.

Times and places:

Lectures: in Greene 104A, Tue. and Thu. 11:30am–12:20pm

Labs: in Greene 236, Tue 1:30–3:30pm or 4:00–6:00pm

Final: in Greene 104A, Wed., May 9, 12:00–3:00pm

Office hours: Mon. & Wed. 9:30–10:30am, Tue. & Thu. 12:30–2:00pm

I am also available at other times. See my schedule on my web site. Stop by my office, or to ensure that I'll be there contact me by phone or email.

Required materials:

Textbook: *Digital Systems: Principles and Applications, 10th edition*, by Tocci, Widmer, and Moss. Readings will not be assigned, but should be clear from lecture topics and homework problems.

Software: *Digital Works 2.0* will be necessary for some homework assignments. It can be downloaded from the main course web page.

Lab Manual: To be downloaded from the lab web site each week, managed by Dr. Pogo.

Lab Materials: All necessary electronics will be furnished by the physics department as needed. This equipment may not be taken out of the lab. If you want to work outside of the lab, you are free to purchase your own equipment.

Lab Binder: A three-ring binder and paper are recommended for the lab.

Required coursework (with fraction of final course grade):

15% Homework & Quizzes: Homework assigned more or less weekly, generally due on Thursday. A few quizzes will be given, announced beforehand, including in each class prior to an exam.

40% Laboratory Exercises and Projects

45% Exams (two during the semester and the final exam)

Exam Schedule:

| | | |
|-------------|---------------|----------------|
| Exam 1: | Tue., Feb. 20 | in class |
| Exam 2: | Tue., Apr. 3 | in class |
| Final Exam: | Wed., May 9 | 12:00 – 3:00pm |

General Comments:

If you must miss a test for a college-sanctioned reason, contact me **before** the exam. If you miss a test due to an emergency, contact me **as soon as possible** and **with documentation**. Absences that don't fall into the above categories will result in a zero for the missed work!

If you need to return materials to me outside of class, your best option is to bring it to my office. Slide it under my door if I'm not in.

SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional or learning disabilities. Students should consult with the Director in the Office of Disability Services (Tabitha Buggie-Hunt, 105D Erwin, tbuggieh@geneseo.edu) and their individual faculty regarding any needed accommodations as early as possible in the semester. Further information available at <<http://disability.geneseo.edu/>>.

Expected Schedule

The following is a tentative schedule; the details are subject to change. The exam dates are firm. If we deviate from this schedule, the material covered by the exams will be adjusted accordingly.

| Week of... | Tuesday | Thursday |
|------------|---|---|
| Jan 15 | Analog vs. Digital; Voltage; Schematics; Digital Switch; Logic | Gates; Truth Tables; Timing Diagrams; Boolean Expressions |
| Jan 22 | DeMorgan's Theorems; Gate Replacement: NAND & NOR; Boolean Algebra; | Designing logic circuits; SOP |
| Jan 29 | MUXes; MUX Expansion; Karnaugh Maps | XOR & XNOR; Active High/Low |
| Feb 5 | Binary Numbers; Counting; Decoders; 7-Segment Displays | Latches; Debouncing |
| Feb 12 | Triggering; Flip-Flops | Quiz 1; Review for Exam |
| Feb 19 | Exam 1 | Current & Resistors; Ohm's Law; Unit Loads |
| Feb 26 | LEDs; Capacitors | Presetting FFs; Transparent Latch |
| Mar 5 | Clock Signals; Frequency Division | Input Sequences; Synchronization; Switching |
| Mar 12 | SPRING BREAK | |
| Mar 19 | Shift Registers; Rings | Menu Selectors; MOD Counters |
| Mar 26 | Series/Parallel; Edge Detectors; FF Internals | Quiz 2; Review for Exam |
| Apr 2 | Exam 2 | 555 Oscillator; Low & High Pass Filters |
| Apr 9 | Two's Complement Numbers | Adding Circuits; Multiplying Circuit |
| Apr 16 | GREAT Day | |
| Apr 23 | Analog Outputs | NAND Internals; Chip Series |
| Apr 30 | Analog to Digital Conversion; Aliasing | |
| May 7 | Final Exam on Wednesday | |

Homework Rules

These rules exist for my convenience in grading. Violating them will affect your grade.

- 1) Use $8\frac{1}{2} \times 11$ inch paper. Do not use any spiral ring paper. **Use only one side of each sheet.**
- 2) Put the assignment number on the top of the first page (e.g., “Digital, Assignment #3”).
Clearly indicate each problem number that you are working on (e.g., Prob. 3-17).
- 3) Be neat. Use a pencil. In this class, students who use pens historically get lower homework credit, because assignments become illegible or confusing as mistakes get blotted out. Similarly, students who use a word processor historically get *much* lower credit, because they usually include only answers without intermediate steps.
- 4) Problems must be presented in the same order as on the assignment.
- 5) **Work must progress down the page.** Solutions should not be horizontally adjacent. If you cannot meet this requirement in your first draft, I expect you to recopy your solutions.
- 6) **Use words** and/or pictures when needed to clarify your method of solution.
- 7) **Along with “answers”, you must provide an indication of what it is an answer to.**
Isolated answers are meaningless. For example, if the problem is to convert 27_{10} to base 2, then simply writing “11011” is inadequate. At a minimum, you need to write “ $27_{10}=11011_2$ ”.
- 8) **Staple** all your sheets together. No substitutions are permitted.
- 9) As in the real world, your intent on any assignment should be to communicate the problem *and* solution to me such that I can focus on the work, with minimal attention to the presentation.