

ELC 2137 Digital Logic Design Lab

Spring 2020 Syllabus

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Hours: TR 12-2pm

Schedule

Week	Sec 1 (Tue)	Sec 2 (Thur)
1 (Jan)	Lab 1 Git and LaTeX Intro	same
2	Lab 2 Transistor Gates	same
3	Lab 3 Adders	same
4 (Feb)	Lab 4 Subtractor	same
5	Lab 5 Verilog Intro	same
6	Lab 6 2-digit 7-seg	same
7	Lab 7 BCD	same
8 (Mar)	Lab 8 ALU	same
9	<i>Spring Break</i>	<i>Spring Break</i>
10	Lab 9 4-digit 7-seg	same
11	Lab 10 FSM	same
12	Lab 11 Stack Memory	same
13 (Apr)	Lab 12 Stack Calculator	same
14	<i>TBD</i>	same
15	<i>Diadeloso</i>	<i>No lab</i>
16	Lab 13 Practical	same

Introduction

In this laboratory course, you will gain practical experience with the tools and methods for designing, simulating, and implementing digital circuits. You will apply the concepts learned in lecture (ELC 2337) and produce working examples of combinational and sequential logic circuits.

Course Objectives

Upon completion of this course, students will:

- Be familiar with basic digital circuit building blocks (for example, decoders, multiplexers, shift registers) and be able to incorporate these fundamental logic circuits into larger, more complicated digital designs.
- Understand the electrical characteristics of fundamental combinational and sequential circuits and know how these characteristics impact digital designs.

- Be familiar with basic sequential circuit design methods and understand the use of flip-flops and latches.
- Know how to use modern software tools for designing and implementing digital systems.
- Have a working knowledge of Verilog for designing and simulating digital circuits.
- Be able to communicate technical information more effectively.

Prerequisites

Credit or concurrent enrollment in ELC 2337.

Materials

You do not need to purchase anything for this lab. One member of each lab team will be required to check out a Basys3 FPGA board. There is no cost, unless you lose or damage the items. Further instructions will be provided on the first day of lab. Lockers are available for storage in Rogers 305, and combination padlocks are available for check out.

You can use the ECS computers for all software. If you would like to have the software on your personal computer, you can download the two primary tools for free:

- LaTeX typesetting tools:
 - Overview: [LaTeX Project](#)
 - Compiler for Windows: [MikTeX](#) - This compiler includes TeXworks which is an editor or “frontend” for writing your LaTeX documents.
 - Editor used in lab: [TeXstudio](#) - This one has more features and a better layout.
- [Xilinx Vivado 2019.1](#) - WebPACK is the free edition. Make sure you’re getting the same version used in the labs (so your files work in both places).

Assignments

Some assignments will be individual, but most laboratories will be conducted as a group of 2-3 students. The instructor will assign students to a group and the groups will be changed halfway through the semester (after Lab 6).

Each laboratory exercise will require a report of some type, and specific instructions will be given with each exercise. Generally, these will be due at the beginning of the next lab session. Division of work during lab and for writing the report is left for the group to decide; however, **each student is responsible for reviewing all group reports and accepting its contents before it is turned in.**

Most exercises will also require a pre-lab assignment, to be done individually. The pre-lab due day/time & location will be given by your instructor.

Missed Labs and Late Work

If a student knows they need to miss lab for a university activity (e.g. sports team), the student should contact the instructor beforehand and make arrangements for completing the missed lab. If a student misses a lab unexpectedly (e.g. illness), they should contact the instructor as soon as possible afterward to make arrangements. In some cases, a Make-up Session is available for a student to complete a single missed laboratory. The actual laboratory missed will be the one conducted. The Make-up Session cannot be utilized to repeat a completed laboratory to attempt to get a better grade.

Unless otherwise arranged with the instructor, submissions will be considered late after the due date. Late reports will receive a 10% penalty up to two weeks, at which time, they will not be accepted (i.e. will receive a zero). Late pre-labs will receive a 10% penalty up to the start of that lab session, at which time, they will not be accepted (i.e. will receive a zero). No submissions will be accepted after the Practical.

Grading

Grades will be based on a weighted average of reports (70%), pre-labs (15%), and practical (15%). Missing items will be assigned a grade of 0. The Laboratory Practical must be completed to receive a passing grade. Final letter grades will be assigned as follows:

Letter	Minimum
A	93
A-	90
B+	87
B	83
B-	80
C+	77
C	73
C-	70
D	60
F	below