

Digital Logic Laboratory – ENGR 211 (1 credit hour)

Abilene Christian University

Fall 2015

Course Description

This laboratory course accompanies ENGR 210 (Digital Logic), supplementing the theoretical presentation of digital logic from lecture with practical logic circuit building experience using tools such as, but not limited to, power supplies, digital multimeters, oscilloscopes, function generators, prototyping breadboards, discrete TTL and CMOS logic devices, and FPGAs. Corequisite: ENGR 210 (Digital Logic).

Class Meeting Times and Location

This class meets Monday in Foster Science Building Room 327 from 2:00PM to 4:50PM

Required Text

The required text for this course is *Experiments in Digital Fundamentals*, by David M. Buchla, 10th Edition, Prentice Hall, 2008, ISBN: 978-0137129652

Catalog Description

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Contact Information

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Please limit cell phone calls to emergencies if after 8 PM

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Office hours: TR 9-11 AM, R 2-5 PM. Additional office hours can be arranged as needed.

Teaching Philosophy

Engineering is a well-respected profession. The public entrusts engineers to be honest, competent, and ethical. Many codes of ethics for these fields indicate that the commitment to protecting the health, safety, and welfare of the public is of paramount importance. These values are in harmony with Christian principles and ideals. Christian engineers should be honest (Matthew 5:37), work hard to ensure competency (Colossians 3:23), and put the public's interest ahead of his or her own (Luke 6:31). In light of these principles, this course will be taught such that you will gain an appreciation for the professional nature of engineering. It will be taught so as to give you every opportunity to begin to develop competency in these fields. This will require homework, quizzes, tests, and group discussion. The instructor especially encourages the discussion of topics that would bear on integrating faith and professional responsibilities (cheating on licensure exams, weapons design and manufacture, environmental laws and employment opportunities in developing nations, etc.)

Learning Objectives and Course Competencies

ABET Learning Objectives	Course Competencies	Measurement
3(a) an ability to apply knowledge of mathematics, science, and engineering	Interpret electronic schematics	notebooks, reports
3(b) an ability to design and conduct experiments, as well as to analyze and interpret data	Debug errantly-behaving digital circuits through the use of a digital multimeter, and/or oscilloscope	participation, notebooks, reports
	Design logic circuits to implement the behavior represented by a truth table	reports, notebooks
3(e) an ability to identify, formulate, and solve engineering problems	Design logic circuits to implement the behavior represented by a truth table	reports, notebooks
3(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Implement circuits represented by schematics on a prototyping breadboard	participation, reports

Student Conduct

Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Violations of academic integrity and other forms of cheating involve the intention to deceive, mislead, or misrepresent and therefore, are a form of lying. Such actions are contrary to behavioral norms that flow from the nature of God. Academic misconduct includes, but is not limited to, the following: 1) Failure to give credit to sources used in a work in an attempt to present the work as one's own, 2) Submission of papers or projects obtained from another source (e.g., research service or club paper file) as one's own, and 3) Falsifying information orally or in writing. Academic misconduct may result in, but is not limited to, a zero on the assignment and/or an F in the course. Additionally, the department chair, Dean of the College of Arts and Sciences, and the Dean of Student Life will be notified. See the full university policy, including how to appeal a decision, by following this link:

<http://www.acu.edu/campusoffices/studentlife/judicialDocuments/AcademicIntegrityPolicy.pdf>.

Attendance

Attendance is expected at all class sessions. It is also expected that you arrive promptly. If you are absent or tardy it will negatively affect your lab practices and/or attendance and preparedness grades.

Grading Policy

Lab Practices –

This is a subjective grade based on your work habits in the lab, your attitude in lab, arriving promptly, coming to lab prepared, how well you work with others, share equipment, and keep the lab clean and take care of equipment.

Attendance and Preparedness –

You must be present at every lab meeting. ***I will not allow you to make up a lab if you are absent.*** There can be exceptions to this policy for emergencies or for university approved

absences, but **you must email or call me the week before you are absent** to discuss the reason. Also, you must read the lab procedure for each week before you come to lab. I will call on random individuals at the beginning of the lab time to briefly tell the class what will be covered that week.

Lab Notebooks –

Your notebook is for jotting things down as you work. I will ask to see them from time to time, but your grade will only be based on whether or not you are using the notebook for this purpose. It doesn't have to be super neat, although I should be able to read what you've written. My intention with this grade is to get you into the habit of writing down your thought process as you work on a project.

Reports –

These are the worksheets in your lab book. Most of the questions have pretty well-defined right and wrong answers. I will grade them partly for effort, but mainly for their correctness. You and your partner will likely have reports that look very similar, but any open-ended questions you are asked to answer should clearly reflect your own voice and style of writing. In other words, *DON'T COPY YOUR PARTNER'S LAB REPORT.*

Calculation of Final Course Grade-

Lab practices	10%
Attendance and Preparedness	40%
Lab Notebooks and Reports	50%

90% and above	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
59% and below	F

ADA Compliance Statement

"Abilene Christian University is dedicated to removing barriers and opening access for students with disabilities in compliance with ADA and Section 504 of the Rehabilitation Act. The Alpha Scholars Program facilitates disability accommodations in cooperation with instructors. In order to receive accommodations, you must be registered with Alpha Scholars Program, and you must complete a specific request for each class in which you need accommodations. If you have a documented disability and wish to discuss academic accommodations, please call our office directly at 325-674-2667."

Disclaimer: This syllabus is complete and correct to my knowledge at the present time; however, this syllabus may be modified at any time if I determine that it is in the best interest of the class to do so.

The mission of the College of Arts and Sciences:

To educate students for worldwide Christian service and leadership through programs of study and other learning experiences that blend a liberal arts education with professional and career education.

The mission of ACU:

To educate students for Christian service and leadership throughout the world.

Digital Logic Lab Schedule

Week	Experiment	Lab Topic
1	1	Laboratory Instrument Familiarization
2	2	Constructing a logic probe
3	3	Number Systems
4	4&5	Logic Gates and More Logic Gates
5	8	Logic circuit simplification
6	9	The Perfect Pencil Machine (Formal Lab Writeup)
7	11	Adder and Magnitude Comparator
8	12	Combinational Logic Using Multiplexers
9	13	Combinational Logic Using Demultiplexers
10	14	The D Latch and D Flip-flop
11	15	The fallen carton detector (formal lab writeup)
12	16	The J-K Flip-flop
13	19	Analysis of Synchronous Counters with Decoding
14	THANKSGIVING BREAK	
15	22	Shift Register Counters