

Abilene Approval Chart for Curriculum Changes

A = Approve I = Information Item R = Respond In Writing

Course Number: ECEN 310

or Degree Plan(s):

	Campus-Level Academic Review ¹	1	2	3	4	5	6
	Change to a Course Include signatures from all chairs/program directors for cross-listed courses. ¹						
1.	Title (description unchanged)	A	A	A	I	I	I
2.	Description (not affecting content)	A	A	A	I	I	I
3.	Course term(s)	A	I	A	I	I	I
4.	Content (change of course outcomes)	A	A	A	I	I	A
5.	Number of credit hours	A	A	A	A	A	A
6.	Course number within the hundred	A	A	I	I	I	I
7.	Course number beyond the hundred	A	A	A	A	A	A
8.	Prerequisites	A	A	A	I	I	I
9.	Course restriction (e.g., majors only, junior standing)	A	A	A	A	A	A
10.	Level change (U to G or G to U)	A	A	A	A	A	A
11.	Cross list course	A	A	A	A	A	A
12.	Department of record	A	A	A	A	A	A
13.	Open or close a course	A	A	A	A	A	A
	Change to a Degree Plan						
14.	Educational Program — Revise	A	A	A	A	A	A
15.	Educational Program — Adopt/revise admission requirements	A	A	A	A	A	A
16.	GPA — Revise program-required GPA	A	A	A	A	A	A
17.	Minor — Revise	A	A	A	A	A	A

		Provost	Senior Vice President	Dean	Department Chair	Faculty	Student	Alumni	Parents	Community
	Full Review									
	Change to Catalog Information (for Campus)									
18.	General requirements for Bachelor's and Associate Degrees	-	-	-	-	A	A	A	A	I
19.	Policies governing academic probation and suspension	-	-	-	-	A	A	A	A	I
20.	Requirements for graduating with honors	-	-	-	-	A	A	A	A	I
	Change to a Degree Plan									
21.	Educational Program — Add or Discontinue ^{2 3}	A	A	A	A	A	A	A	A	I
22.	Educational Program — Discontinue (Provost-proposed)	R	-	R	A	A	A	A	A	I
23.	Minor — Add or Discontinue	A	A	A	A	A	A	-	A	I
24.	Minor — Discontinue (Provost-proposed)	R	-	R	A	A	A	-	A	I
25.	Degree — Add or Discontinue	A	A	A	A	A	A	A	A	I
26.	Degree — Discontinue (Provost-proposed)	R	-	R	A	A	A	A	A	I

	Change to General Education Requirements for Undergraduates (System)	Provost	Senior Vice President	Dean	Department Chair	Faculty	Student	Alumni	Parents	Community
27.	Change course outcomes of an included course	A	A	A	A	A	A	-	A	I
28.	Add or drop a required course from the General Education Requirements	A	-	A	-	A	A	A	A	I
29.	Add or drop a course from a menu within the General Education Requirements	A	-	A	-	A	A	-	A	I
30.	Comprehensive revision of General Education Requirements	-	-	-	-	A	A	A	A	I

Notes

² Any change to a cross-listed course requires the signature of both department chairs or program directors overseeing the course to ensure that the courses stay in sync. This includes courses taught at other campuses (e.g. BIBL 101 and BIBO 101).

³ For undergraduate majors, a minimum of 30 hours is required. These programs must have a minimum of 6 elective hours, unless the requirements of external accrediting bodies make it impossible. Master's programs must include a minimum of 30 hours, and doctoral programs must include a minimum of 30 hours beyond the master's.

⁴ When a department/school or dean proposes closing a program, approval routing follows the typical process beginning with the department/school. An administrative proposal by the provost or senior vice president for academic affairs would follow the "provost-proposed" routing on the chart.

Department/School(s)	
	<u>10/29/24</u>
Chair Signature	Date

Chair/Program Director Signature	Date
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College Academic Council(s)	
	10/30/24
Chair Signature	Date

Chair Signature	Date
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Dean(s)	
	10/30/24
Signature	Date

Signature	Date
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Teacher Education Council	
Signature	Date

Campus Academic Council:	
Abilene Undergraduate or Abilene Graduate	
Signature	Date

Provost	
Signature	Date

University General Education Council	
Signature	Date

University Faculty

Abilene Faculty Senate Chair signature

Date

Dallas Faculty Council Chair signature

Date

Senior Vice President for Academic Affairs

Signature

Date

President

Signature

Date

Abilene New Course Application

You may delete the preceding instructional pages before submitting application.

Course ID (<i>Subject Code and Number</i>)	ECEN 310
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1. Systems and Catalog Information Complete each item.

A	Course Developer	Darby Hewitt
B	Course Instructor	Darby Hewitt
C	Course Title	Digital Electronics Laboratory
D	Course Abbreviation for Banner if title is more than 30 characters	Digital Elec. Lab.
E	College	OSE - Onstead Science and Engineering
F	Department or School	PHYS - Engineering & Physics
G	Number of Credit Hours	1
G1	Number of Lecture Contact Hours	0
G2	Number of Lab Contact Hours	3
H	Is the course for a fixed or variable number of credit hours?	Fixed If variable, explain rationale:
I	Is the course repeatable for additional credit?	No
J	Maximum total number of credit hours a student can earn for this course	1
K	Course Schedule Type	Lab (LAB) See Schedule Type definitions in the Reference section.

L	Number of Faculty Workload Hours	3
M	Grading Mode	Standard
N	Maximum Enrollment	20
O	Catalog Description (50 words or less)	Applications of Boolean logic through the design and implementation of digital systems using Hardware Description Language (Verilog or VHDL) and FPGAs.
P	List any prerequisites (course/s, test scores, class standing, major, etc.)	ECEN 210
Q	List any corequisites (these <i>must</i> be taken at the same time; note that a single requirement cannot be both a prerequisite <i>and</i> a corequisite)	
R	If the course is cross-listed, specify the subject code and course number of the other course	
S	Does this course require any additional student course fees?	Yes If yes, attach a completed course fee form .
T1	Will the course be offered in fall terms?	Yes, every year
T2	Will the course be offered in spring terms?	No
T3	Will the course be offered in summer terms?	No
U	First semester this course will be offered under new Course ID. <i>May not be earlier than the coming fall semester.</i>	Fall 2025

V	Is this course required for a program(s)?	No If yes, submit a separate completed curriculum proposal to change the program(s).
W	Should the addition of this course be retroactively applied to the degree plan it supports? <i>This is rare, and rationale should explain compelling extenuating circumstances.</i>	No If yes, provide rationale:
X	Has this course been offered as a Special Topics course? <i>New courses are not required to be taught as Special Topics courses prior to approval.</i>	No If yes, provide course ID, term, and enrollment:
Y	List any courses in which the content overlaps the proposed course. (Course ID and Name). <i>Attach a statement from the instructor/dept chair of the existing course justifying the new offering.</i>	

2. Curriculum

- A. Explain any effects of this course on any degree plans. If the addition of the course alters program requirements, submit a separate [Approval Chart for Curriculum Change](#) to update the program.
- B. Justify the addition of this course to the current curriculum, explaining the gap it meets.

3. Course Design

A. Audience and Course Goal

1. Describe the intended audience, including prerequisite skills.

Intended for EE majors or CS majors with digital electronic hardware development interest; basic digital logic concepts gained from ECEN 210 are the only prerequisite skills for this course

2. State the overarching course goal(s) in performance terms.

The goal of this course is to provide students with exposure to field programmable gate arrays (FPGAs) and hardware description languages (HDLs, primarily Verilog), and practice using these to develop digital electronic devices and systems.

B. Student Learning Outcomes and Measurements

Through this course, students should gain an ability to:

	Student Learning Outcome	Measurement
1	Evaluate various design techniques within the context of digital electronics	Lab reports
2	Construct microprocessor components using hardware description languages	Lab reports
3	Design a fully-functional microprocessor using the Verilog hardware description language	Lab reports, final project report and demonstration
4		
5		

C. Text and Resources

Give the full publication information of the textbook/s and other required resources and outside readings.

Required course materials:

- “Introduction to Logic Circuits & Logic Design with Verilog” by Brock J. LaMeres
- FPGA development board (provided)

4. Supporting Documentation

Required of all applications	
1	Approval Chart for Curriculum Changes
2	Syllabus — Attach the syllabus for the course based upon the anticipated first-semester offering.
4	Library — Submit new course application and syllabus to the Library dean’s office. Attach the Library’s memo.

Attach if applicable	
5	Content Overlap — Include one document for each course you listed in Section 1Y. Attach statement from instructor/dept chair of existing course justifying the new offering.
6	Departmental Resources — List the resources that support the course and are available only through the department, if applicable. Attach the list of the holdings and the location(s).
7	Resources — List resources (other than library or departmental resources) that are needed to support this course (computers, lab equipment, other technology, etc.). Attach a complete list of all items and indicate possible sources or estimated cost of each. List the sources of any needed funds.
8	Expenses — List additional expenses needed to implement this course (full-time or part-time faculty, graduate or lab assistants, student employees, travel, special student costs, room renovation, storage facility, etc.). Attach a complete list of all items, the estimated cost of each and the source of the funds.
9	Justification — Attach any documents to which you refer in Section 2B.

Updated 8/19/2024

ABILENE CHRISTIAN UNIVERSITY

LIBRARY

M E M O R A N D U M

DATE: October 29, 2024
TO: Dr. Darby Hewitt
FROM: Mark McCallon, Associate Dean for Library Information Services
RE: Course Application for ECEN 310 – Digital Electronics Laboratory

After reviewing the course application and syllabus, the library does have adequate resources to support the proposed course. Please contact Mark McCallon, Librarian Liaison, if additional resources are needed for the course. Thank you for letting us review the course proposal and syllabus.

Necessary Resources for ECEN 310 – Digital Electronics Laboratory

20x Basys 3 FPGA development boards: ~\$3500 (\$165/board)



Request to Add or Change Course Fees

Course fees or changes to existing course fees must be approved and published in the ACU Catalog for the following year in order for them to be assessed on a student's account. Course fees which are not processed by February 1st will not be included in the fall catalog.

Request Date _____ Amount of Fee \$70

Department Making Request Engineering and Physics Contact Person Darby Hewitt

Semester and year for fee to begin Fall 2025

FOAP: _____

Check the appropriate fee category below:

☒ Fee is the same for every section and every student

☐ Fee applies to certain sections only

If fee applies to certain sections only, please specify below if it is a one-time fee for a single section or a repeating fee that will be applied on a regular schedule (e.g., a fee charged each time the course is taken in a summer session but not in the fall or spring).

This request applies to the following course (one per form):

Course Number / Section ECEN 310 Course Title Digital Electronics Laboratory

State the justification for your request below. You will be notified of final approval or denial.

This lab requires maintenance and replenishment of electronic equipment and supplies for each student.

The following signatures must be obtained before any request is approved.

		Approved	Declined
_____	_____	☐	☐
Department Chair	Date		
_____	_____	☐	☐
College Dean	Date		
_____	_____	☐	☐
Provost	Date		
_____	_____	☐	☐
Vice President for Finance	Date		

If approved by all above, route to:

_____	_____	_____
Controller	FOAP	Date Completed
_____	_____	_____
Finance	Fee Code for use on course	Date Completed
_____	_____	_____
Registrar's Office		Date Completed

Syllabus – ECEN 310: Digital Electronics Laboratory

About the Course

Tuesday 2-5 PM

1 credit hour

Fall 2025

BEN 212

About the Instructor

Professor Darby Hewitt, PhD

Office: OSC 121B

Phone: 217 417 5859

Email: darby.hewitt@acu.edu

Office hours: MWF 8-10, Tues. 12-1

Catalog Description: Applications of Boolean logic through the design and implementation of digital systems using Hardware Description Language (Verilog or VHDL) and FPGAs. Prerequisite: ECEN 210

Faith and Learning in the context of engineering courses: In any professional context, our faith should influence our work ethic. The author of Ecclesiastes encourages his readers to do whatever they do with all their might (paraphrase of Eccl. 9:10). You should be mindful of the faith tradition you represent with your actions when you go to work, and the classroom is a great place to start practicing that mindfulness.

Intended audience: Electrical Engineering majors and computer science majors interested in computer engineering

Format of course/types of activities: This is a laboratory course in which you will learn techniques of digital design through the implementation of a basic 4-bit processor in an FPGA over the course of the semester. In this course, students should expect to work each week to create a specific piece of a microprocessor using Verilog. In the final month of the course, we will integrate each of the modules we created throughout the semester into a standalone microprocessor.

Course materials:

- “Introduction to Logic Circuits & Logic Design with Verilog” by Brock J. LaMeres
- FPGA development board (provided)

Learning Outcomes (assessed through weekly lab reports, demonstrations, and a final project report and presentation):

Through this course, students should gain an ability to:

- Evaluate various design techniques within the context of digital electronics
- Construct microprocessor components using hardware description languages
- Design a fully-functional microprocessor using the Verilog hardware description language

Outline of topics by week:

Week	Topic
1	Introduction to Verilog
2	Simulation and timing diagrams
3	Structural vs behavioral designs
4	State machine implementations
5	Architecture of the Intel 4004 and its parts
6	Bit slice ALU design
7	4-bit ALU integration
8	Register bank implementation
9	Stack module
10	Timing and control module
11	System integration from multiple Verilog modules
12	Assembling the Intel 4004
13	Creating simulation program
14	HDL synthesis
15	Hardware deployment of Intel 4004 using FPGA

Format of Class:

Each week, a new module will be opened in Canvas with a lab assignment for that week. The demonstration of that week's lab assignment along with the corresponding lab report will typically be due by the following week at lab time, unless otherwise noted on Canvas. Lab reports will be graded based on a rubric, which will be attached to the assignment.

Final Grade Composition:

Your final grade in this course will be calculated by performing a weighted average of your assignments according to the following table:

Weekly lab projects:	40%
Lab practices:	10%
Final project:	50%

Grade scale:

89.5% and above: A

79.5% to 89.4%: B

69.5% to 79.4%: C

59.5% to 69.4%: D

Below 59.5%: F

Weekly lab projects: Every week I'll have an activity for you to complete. These will often require you to demonstrate working code to me, and sometimes you'll also have to write a report about what you did.

Lab practices: This grade is subjective. You should be able to get all these points if you are prepared, on time, tidy, and respectful to me and your classmates.

Final project: This grade will include your project report, the functionality of the final product, and your final presentation.

Attendance: You really need to be here every week in a lab class. Don't get behind! It's really hard to catch up if you do.

Academic Integrity

I think that cheating is the worst thing someone could do in college, and that is saying a lot. Cheating is an act so counter to academic principles (not to mention Christian morality) that I will report any infraction without exception. See <https://acu.edu/dean-of-students/student-handbook/academic-policies/> for the full university policy.

University 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.

Title IX Information and Policy

At ACU, we strive to comply with all applicable legal requirements prohibiting, preventing, and responding to sexual misconduct against any member of the ACU community. Moreover, as a Christian community, ACU has committed itself, unequivocally, to ensuring a working and learning environment in which the dignity of every individual is respected.

*Our Title IX – Sexual Misconduct Policy outlines specific definitions and procedures related to **sexual harassment, sexual exploitation, sexual assault, stalking, and relationship violence**. If you experience sexual misconduct in any of these forms, we encourage you to [report it](#) so that we can help maintain a work and academic environment free of unlawful behavior.*

Engineering and Physics Department Mission:

The ACU engineering program strongly supports the university's mission of educating students for Christian service and leadership throughout the world. In support of this mission, ACU engineering graduates will attain:

- A deep and broad understanding of engineering principles and practices as evidenced by professional employment, continued professional development, and graduate study in engineering or other professional fields.
- An extensive knowledge of innovative design processes unique to engineering professionals as demonstrated by using critical thinking skills to contribute to scientific and technical literature, patents and intellectual property, professional societies, and creative designs.
- A thorough understanding of Christian service and leadership as shown in their commitments to professionalism, ethics, and service and leadership within the engineering profession, the church, and society.

The mission of the Onstead College of Science and Engineering is to explore and understand God's creation in the natural world and apply the acquired knowledge and principles to address its issues and challenges.

The mission of ACU is to educate students for Christian service and leadership throughout the world.

9/19/2024

Professor Darby Hewitt, PhD
Office: OSC 121B
Phone: 217 417 5859
Email: darby.hewitt@acu.edu

Re: Review of ECEN 310: Digital Electronics Laboratory

Dear Dr. Darby,

Thank you for the submission of ECEN 310: Digital Electronics Laboratory. I reviewed the syllabus based on the [ACU Syllabus Guidelines](#). This syllabus appears to include all the required elements for ACU syllabi.

This letter is not meant to be a final approval in the course application process. Instead it is intended as a reference which will be read by your department chair and members of the council, who may also have questions or comments of their own.

Thank you for allowing the Adams Center team to review your course application. We would love to work with you on your syllabus, as well as the design, development, or revision of this and other courses. If there is anything else we can do to help you, please feel free to let me know.

Sincerely,

A handwritten signature in cursive script that reads "Amy Boone".