ET285
Digital Electronics II
[Onsite]

Course Description:

This course continues the study of digital electronics. The focus in this course is on sequential logic. In lab, students construct, test and troubleshoot digital circuits.

Prerequisite(s) and/or Corequisite(s):

Prerequisites: ET245 Electronic Devices II, ET255 Digital Electronics I

Credit hours: 4

Contact hours: 50 (30 Theory Hours, 20 Lab Hours)

STUDENT SYLLABUS: DIGITAL ELECTRONICS II

Instructor: _____

Office hours: _____

Class hours: _____

Major Instructional Areas

- Counter Operations
- Counter Applications
- Troubleshooting
- Logic Symbols with Dependency Notation
- Programmable Logic
- Basic Shift Register Functions
- Basics of Semiconductor Memory
- Magnetic and Optical Storage
- Testing and Troubleshooting
- Introduction to FPGAs
- Digital Signal Processing Basics
- Analog and digital signal conversions
- The Digital Signal Processor (DSP)
- The GAL22VN
- The GAL16V8
- Introduction to ABEL
- PLD System Implementation
-

Course Objectives

Upon successful completion of this course, the student should be able to:

1. Explain the operational characteristics and compare and contrast different types of counters.
2. Design counters that will have any specified sequence of states.
3. Explain digital clock circuits and report in detail how they are used in digital circuits.
4. Explain the operational characteristics and compare and contrast different types of shift registers and describe their uses (e.g., to implement serial to parallel conversion of digital data).

5. Explain the operational characteristics and compare and contrast different types of memory devices and describe how they can be tested.
6. Explain the operational characteristics and compare and contrast different types of A/D and D/A converters.
7. Describe the operation and uses of Programmable Logic Devices (PLDs) and use a simple PLD to implement combinational and sequential logic.
8. Demonstrate skills learned in digital electronics in assembling, designing, and troubleshooting circuits using devices and techniques studied in this course.
9. Plan, design, implement, and demonstrate a digital design application project.

Teaching Strategies

Curriculum is designed to promote a variety of teaching strategies that support the outcomes described in the course objectives and that foster higher cognitive skills. Delivery makes use of various media and delivery tools in the classrooms.

Student Textbook and Materials

Text: Floyd, Thomas L. *Digital Fundamentals, Custom edition taken from 8th Edition, Pearson Custom, 2005.*

Lab Manual: Buchla, David, and Jerry Cox. *Supplemental Text to Accompany Digital Fundamentals, Indianapolis, IN: Pearson Custom Publishing, 2007.*

CDs: Snyder, Gary, Multisim Circuit Files to Accompany Digital Fundamentals CD, Pearson Custom, 2011.

Snyder, Gary, Multisim Circuit Files for Supplemental Text to Accompany Digital Fundamentals CD, Pearson Custom, 2011.

The lab manual is a custom-published book combining material from both the Buchla and Cox standard manuals (ISBNs 013-084660-0 and 013-084672-4).

Course Outline

Week	Topic (Lecture Period)	Chapters	Lab and Other Coverage
1	Asynchronous Counter Operation Synchronous Counter Operation Up/Down Synchronous Counters Design of Synchronous Counters Cascaded Counters	9-1 through 9-5	Buchla 19
2	Cascaded Counters Counter Decoding Counter Applications Troubleshooting Logic Symbols with Dependency Notation	9-6 through 9-10	Buchla 20 or 22
3	Basic Shift Register Functions Serial In/Serial Out Shift Register Serial In/Parallel Out Shift Registers Parallel In/Serial Out Shift Registers Parallel In/Parallel Out Shift Register	10-1 through 10-5	Buchla 23
4	Parallel In/Parallel Out Shift Register Bidirectional Shift Registers Shift Register Counters Shift Register Applications Troubleshooting	10-6 through 10-11	Buchla 24 or 25

Week	Topic (Lecture Period)	Chapters	Lab and Other Coverage
5	Exam I – Chapters 9 & 10 Basics of Semiconductor Memory Random Access Memories (RAMs) Read-Only Memories (ROMs) Programmable ROMs (PROMs and EPROMs) Flash Memories	12-1 through 12-5	Buchla 27
6	Memory Expansion Special Types of Memories Magnetic and Optical Storage Testing and Troubleshooting Introduction to FPGAs	12-6 through 12-10	Cox 28
7	Digital Signal Processing Basics Converting Analog Signals to Digital Analog-to Digital Conversion Methods The Digital Signal Processor (DSP) Digital-to-Analog Conversion Methods	14-1 through 14-5	Buchla 28
8	Exam II – Chapters 12 & 14 The GAL22VN The GAL16V8 Introduction to ABEL	7-1 through 7-3	Buchla 14
9	Implementing Shift Registers with PLDs Implementing Counters with PLDs PLD System Implementation	11-1 through 11-3	Buchla 26
10	Digital Design Project		
11	Project Presentations **Final Exam**		

Evaluation Criteria and Grade Weights

- Quizzes 10%
- Homework 15%
- Exams 15%
- Lab exercises 30%
- Final exam 15%
- Lab Project 15%

Final grades will be calculated from the percentages earned in class as follows:

A	90 - 100%	4.0
B+	85 - 89%	3.5
B	80 - 84%	3.0
C+	75 - 79%	2.5
C	70 - 74%	2.0
D+	65 - 69%	1.5
D	60 - 64%	1.0
F	<60%	0.0

