

Engineering Technology –ECET Option

Course Number and name: ET 398 Digital Systems

Credits & Contact Hours: ET 398 is 3cr. Each week has two lectures of 50 min(3 cr). Total semester contact hours are approximately 45 hr.

The accompanying laboratory is a 3p lab and meets for 2hr and 40 min each week in one lab session per week

Instructor's name: Lynn Kelly

Textbook title, author, and year: *Digital Design, Peter J. Ashenden*, Morgan Kaufman, 2007;

Additional Materials: Altera's DE-2 board and Altera's supporting tutorials.

Specific Course Information:

- a) **Course Catalog Description** – Advanced analysis and design of digital systems using state machine logic, programming of logic devices, implementation and testing.
- b) **Co- or Prerequisite:** ET 362 (Co), ET 282(Pre)
- c) This course is required only for the ECET degrees. It can be taken as part of the Digital Applications Minor.

Course Goals & Objectives:

To acquaint the student with the advanced methods of digital design including the use of programmable logic devices (PLDs), digital design tools such as Altera and HDL. The student will have the opportunity throughout the semester to demonstrate their ability to design and assemble complex digital systems.

Related ABET Objectives and Outcomes: The department of Engineering Technology and Survey Engineering ECET option has an objective of having its graduates possess the following skills and knowledge.

1. An appropriate mastery of the knowledge, techniques, skills and the modern tools of their disciplines including:
 - **Digital circuit analysis and design techniques**, architecture and applications of microcomputer systems, and the building, testing, operation and maintenance of electronic and computer systems.
 - The use of **Boolean mathematics in support of** the analysis, design, and application of electronic systems.
2. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology;
3. Project management techniques and teamwork necessary for successful electronic and/or computer system designs and implementations, and the effective use of communication skills to prepare technical reports, memos, and presentations.

Course topics and lecture hours devoted to each topic:

TOPICS	HRS.
• Intro to Design and VHDL	3
• VHDL – Combinational logic	6
• VHDL Sequential coding and circuits	6
• VHDL Components and digital devices	6
• VHDL Flip Flops	3
• VHDL State Machine Design	9
• Project	18
• Tests and Quizzes, Review, Problem Solving and Examples	8

Laboratory Projects: There is approximately 8 laboratory sessions per semester. Each Lab consists of an VHDL lab component and demonstration on the Altera DE2 board. Laboratory exercises are done in conjunction with the text readings and the lecture materials. The laboratories are designed to apply the theory of the analysis with the application and simulation of the circuits. Students must take a problem specification, design a digital circuit, write the VHDL code for the circuit, and verify the design by testing via the DE2 board. The Labs end mid semester and the students will begin work on the final project, implementing skills learn in the course and previous courses. At the end of the semester the Student presents their project and reports.

Prepared by: Lynn Kelly

Date: 9/1/10