Engineering Technology –ECET Option

Course Number and name: ET 282 Digital Electronics

Credits & Contact Hours: ET **282** is 4cr. Each week has three lectures of 50 min(3 cr). Total semester contact hours are approximately 45 hr.
The accompanying laboratory is 1cr. (3p) 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 Fundamentals,10th ed., Floyd,* Prentice Hall, 2009;

Specific Course Information:

a) **Course Catalog Description –** Application of digital integrated circuits, multiplexers, counters, arithmetic circuits, and microprocessors.
b) **Co- or Prerequisite:** ET 190 (Co), ET 182(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 provide the student with knowledge and skills relating to digital logic and electronic design and applications

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;

Course topics and lecture hours devoted to each topic:

TOPICS	**HRS.**
• Review of basic combinational construction	3
• Adders	3
• Comparators	3
• Coders(Encoders, Decoders)	3
• Mux	3
• Flip Flops	6
• Counters	4

- Registers 4
- Introduction to VHDL 3
- Tests and Quizzes, Review, Problem Solving and Examples 8

Laboratory Projects: There is approximately 14 laboratory sessions per semester. Each Lab consist of an in lab component and an electronic based simulation problem. 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, construct the circuit, and verify the design by testing with test and measurement equipment. A formal lab write-up is required by each group. Equipment utilized by the students include (but is not limited to): Digital Multimeters, Oscilloscopes, logic probes, Cadet designer boards (with built-in switches, LED's, function generators power supplies). LS chips associated with the topics presented in class.

Example of topics for laboratories might include those topics covered in the ET 282 lecture section

Lab1:Course Introduction – Altera tutorial, basic circuit electronic construction/simulation. Lab procedures and write-up formats
Lab 2: Basic Review of combinational circuit construction and test
Lab 3: Adders
Lab 4: Comparator
Lab 5: Coders
Lab 6: Mux
Lab 7: Review of one of the above
Lab 8: Flip Flop 1
Lab 9: Flip Flop 2
Lab 10: Counters
Lab 11: Registers
Lab 12: Review of one of the above
Lab 13: VHDL
Lab 14: VHDL

Prepared by: Lynn Kelly **Date: 9/1/10**

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:

d) Course Catalog Description – Advanced analysis and design of digital systems using state machine logic, programming of logic devices, implementation and testing.

e) Co- or Prerequisite: ET 362 (Co), ET 282(Pre)

f) 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.

3. 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.
4. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology;
5. 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 Flps 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**