ECE 1315 – Syllabus – Fall 2008
REQUIRED COURSE

Instructor: Scott R. Norr Office: 43 MWAH Phone: 726-8947
Office Hours: 1:30 to 2:30 PM on Mondays, Wednesdays; also 11-Noon on Thursdays
Email: snorr@d.umn.edu

OFFICE SCHEDULE

Lecture Place & Time: MWAH 191, 10:00 – 10:50 PM M,W,F
Lab Place & Time: MWAH 55, Tuesdays, 9:30AM-12:30PM, 1 to 4 PM

Textbook: Brown/Vranesic, *Digital Logic with VHDL*, 3rd Edition, McGraw-Hill 2009
Lab Manual: Laboratory exercises will be available on the course website,http://www.d.umn.edu/~snorr/ece1315f8
Computer Usage: Altera Corp.'s MAX+PLUS II and QUARTUS software will be used in the course
Assessment: **Labs - 20%; Homework - 15%; Exams 1 and II - 40%; Final Exam - 25%.**
Labs are graded on a 10 point scale. Labs are due *in Lab* on the following Thursdays.
Homework is due in class, one week from the date assigned.
Material that you submit for grading is expected to reflect your own ideas and work.

Dates	Topic	Chapter
9/3, 9/5	Introduction, Number Systems, Coding	1, 5.1
9/8-9/12	Base-2 Operations, Boolean Algebra and Functions	2
9/15-9/19	Logic Gates, VHDL, CMOS Technology, PLDs	2,3
9/22-9/26	Gate Properties, K-Maps, Prime Implicants/Implicates	3, 4
9/29-10/3	Minimal Implementation, Multiple Outputs, **Exam I**	4
10/6-10/10	Design Analysis and Optimization	4
10/13-10/17	Design Languages and Computer Aided Design	Appendix A
10/20-10/24	Arithmetic Circuits – Adders, Multipliers	5
10/27-10/31	Latches, Flip Flops, Registers and Counters	7
11/3-11/7	Synchronous Circuits and Clocking, Mealy/Moore Machines	7
11/10-11/14	State Assignment, State Minimization	7
11/17-11/21	Finite State Machines, **EXAM 2**, Multiplexers	7, 6
11/24, 11/26	Design with MUX and Decoders, Empirical Design	6
12/1-12/5	Asynchronous Circuits	9
12/8-12/12	Embedded Systems, Modern Applications	Outside Reading
12/17	**FINAL EXAM**: Wednesday, December 17, 10:00 – 11:55 AM	

Accreditation Outcomes Addressed By This Class: (Students should demonstrate:….)

a. an ability to apply knowledge of mathematics, science and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs
e. an ability to identify, formulate, and solve engineering problems.
g. an ability to communicate effectively.
i. a recognition of the need for, and an ability to engage in life-long learning
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
n. an ability to work in a hands-on laboratory in most of the required courses.

Individuals who have any disability, either permanent or temporary, which might affect their ability to perform in the class, are encouraged to inform the instructor at the start of the semester. Adaptations may be made as required to provide for equitable participation

Prepared by ___________________________________ Date: September 2, 2008

ECE 1315 – Digital System Design

Fall Semester, 2008

2005-2007 Catalog Course Description:
Binary number system and digital coding techniques. Boolean algebra, combinational logic circuits, and minimization techniques. Synchronous sequential circuits and state reduction techniques. Medium Scale Integration (MSI) combinational components.

Prerequisites: None

Course Outcomes: **(Students should . . .)**

- Master number representation in digital systems, including binary numbers and conversion techniques (a,l)
- Understand the mathematical foundations for digital circuits, including Boolean Algebra (a,k,l)
- Use standard tools for Boolean function manipulation, including Karnaugh maps and other techniques (a,e,k)
- Employ a variety of circuit elements to implement given combinational and sequential functions (a,b,c,e,n)
- Recognize the difference between transparent latches and flip-flops as memory components (a,b,e)
- Study techniques for minimizing circuit complexity and cost (c,e,k)
- Implement synchronous sequential circuits to satisfy given design specifications (a,b,c,e,n)
- Experience modern implementation techniques using programmable logic devices (a,b,c,e,i,n)
- Analyze and design digital circuits to meet specified criteria (a,b,c,e,n)
- Communicate an understanding of the material through formal lab reports (g)
- Demonstrate facility with above topics in a hands-on laboratory setting (a, b, g, n)

[“a – n” are accreditation outcomes – see below]

Educational Goals:
This first course in digital circuits is designed to familiarize students with standard techniques for analyzing and designing digital systems. The course covers basic approaches to design and minimization techniques, for both combinational and synchronous sequential circuits.

The laboratory component of the course provides students an opportunity to design, debug, and test their implementations of the various circuits discussed in class. An important part of engineering is actually “making it work” and this lab portion of the class emphasizes that commitment. There is no better way to gain an appreciation for how a circuit works than by actually wiring it and discovering how it misbehaves as a result of various wiring errors. Such experience is not available if designs are tested only through simulation.

The economics of digital design are emphasized by allocating a portion of the lab grade to the “cost” of the student’s implementation. Clear documentation of lab results is required to emphasize the importance of recording experimental successes and failures.

Relationship to ECE Program Objectives:

- Provides foundation for students’ understanding of digital systems
- Incorporates current devices in student solutions to lab problems
- Merges student understanding of digital logic with mathematical underpinnings
- Prepares students for further study of digital systems by establishing a solid foundation of tools and techniques
- Exposes students to current implementation techniques