

UNIVERSITY OF SOUTHERN MAINE

Department of Engineering

ELE 373 – Advanced Digital Architecture and Design

Required

Instructor: Mariusz Jankowski, mjankowski@usm.maine.edu, JMC 127, ph. 780-5580 Updated 01.14.2009

Schedule: Lecture: 2 - 1hr and 40min. lectures/week, T&Th, 2.00 - 3:40 PM, JMC-252, Spring 09

Course Description (Catalog):

Basic principles of digital system design and the use of hardware description languages in the design process. Methods of design and testing of multi-input, multi-output logic systems including arithmetic units, logic controllers and microprocessors. Logic design with PLDs, FPGAs, and VHDL. Prerequisite: ELE 172. Credits 3.

Contribution to Professional Component:

70% Engineering Science, 30% Engineering Design

Textbook:

Circuit Design with VHDL, V. A. Pedroni, MIT Press, 2004.

Topics:

1. Logic design fundamentals.
2. Programmable logic devices.
3. Design of arithmetic circuits using programmable logic.
4. Logic design using schematic capture and ABEL.
5. Programmable Gate Arrays and Complex Programmable Logic Devices.
6. Logic design using VHDL.

Course Objectives:

1. Students will gain an understanding of logic design fundamentals.
2. Students will learn the basics of HDL-based digital design using ABEL and VHDL.
3. Students will gain an understanding of the architectural complexity of a variety of programmable devices.
4. Students will learn how to test and implement their designs using modern software tools.

Assessment Methods:

1. Graded quizzes.
2. Graded exams.
3. Design projects.
4. Graded laboratory reports.

Course Learning Outcomes:

Students will be able to...	Course Objectives (1, 2,...):	Assessment Methods (1, 2,...):	Program Outcomes (a-k):
<ul style="list-style-type: none"> <li>• Design simple combinational logic circuits and logic controllers.</li> </ul>	1	1, 2	a, e, k
<ul style="list-style-type: none"> <li>• Implement simple logic circuits using GALs</li> </ul>	2	1, 2	a, e, k

• Design arithmetic networks using a variety of design input methods	1, 2, 3	1, 2, 3, 4	a, e, k
• Construct, test and analyze circuits in a laboratory setting	3, 4	3, 4	a, e, k
• Document their design and laboratory work. More ...	2, 3	3, 4	a, e, k

**Grading Policy:**

Students are expected to participate in class by being prepared for the lecture and laboratory and engage in discussions.

Grade Distribution:

Quizzes (2-4)	30%
Final exam	30%
Design projects (3-5)	40%

**Summary of Course Changes Since the 2003 ABET Self-Study Report:**

2005: Added Quiz 0 to test students’ retention of prerequisite material and to determine pace/depth of review.

2009: Linked learning outcomes to course objectives, assessment methods and revised program outcomes.

**Academic Support for Students with Disabilities:** Students who may need assistance due to a disability are encouraged to contact the Office of Academic Support for Students with Disabilities, Luther Bonney 242, ph. 780-4076, TTY 780-4395.