ECE9707

THE UNIVERSITY OF WESTERN ONTARIO
FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ECE 9707 – DIGITAL SYSTEMS DESIGN USING FPGAs

COURSE OUTLINE – 2010

OBJECTIVE:

Field programmable gate array (FPGA) is one of the fastest growing fields in very-large-scale integrated circuits (VLSI) and microelectronics and is being used in almost all areas of digital signal processing, telecommunications, computer networks and cryptography. The course will cover the simulation, programming and testing techniques of FPGA-based systems.

CONTRACT HOURS: 3 lecture hours/week, half course

ANTIREQUISITE: None

PREREQUISITES: Bachelor's degree in Computer Engineering. Undergraduate course such as ECE2277/ECE3339 is desirable.

COURSE CONTENTS:

- Overview of VLSI and microelectronics
- Survey of FPGA fabrics
- Combinational and sequential circuit design for FPGA
- Introduction to VHSIC hardware design language (VHDL)
- FPGA design process and methodology
- Low power design
- Testing and faults
- Introduction to Computer Arithmetic

SPECIFIC LEARNING OBJECTIVES:

1. To introduce the principles of FPGA technology
2. To understand the FPGA design and implementation hierarchy
3. To understand the VHDL language
4. To provide the FPGA design, simulation, implementation and testing techniques from VHDL coding to chip programming using Xilinx tools
5. To understand how to optimize FPGA-based digital designs in terms of size, speed and power

consumption

REFERENCES:

- Textbook: Wayne Wolf, "FPGA-Based System Design," PRENTICE HALL, 2004, ISBN:0-13-142461-0

Additional material for the book can be found at: http://www.waynewolf.us/fpga-book/index.html

- Materials from Xilinx University Program
- Articles from journals and conferences.

PROJECT AND ORAL PRESENTATION:

The students in the course will be required to work on a project and make an oral presentation along with the project-report submission.

EVALUATION:

For the purpose of evaluation, the course is divided into two components, namely

a. project - report and oral presentation
b. final examination

The final course grade will be determined from students' performance in the project and the final examination. The examination shall be semi-open book; calculators and formula sheets will be allowed.

In order to pass the course, a student must obtain a passing grade in each component. A student who fails either component shall receive a final grade not greater than 48%. The weighting of each of these components will be as follows:

		Maximum Penalties*	
Component	Value	English	Presentation
Project: Report and Presentation	75%	10%	10%
Final Examination	25%	10%	10%

*In accordance with the policy of the University, the grade assigned to all written and oral work presented in English shall take into account syntax, diction, grammar and spelling. In the professional life of an engineer, the manner in which oral and written communications are presented is extremely important. An engineering student must develop these skills as an integral part of the undergraduate program. To encourage the student to do so, the grades assigned to all written and oral work will take into account all aspects of presentation including conciseness, organization, neatness, use of headings, and the preparation and use of tables and figures.

All work will be marked first for content after which a penalty not to exceed the maximum shown above may be applied for lack of proficiency in English and/or presentation.

ATTENDANCE:

Any student, who in the opinion of the instructor is absent too frequently from class in this course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

CHEATING:

University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

PLAGIARISM:

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). The following web site provides some clear examples that will help avoid plagiarism:
http://www.hamilton.edu/academics/resource/wc/usingsources.html

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you, You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 X 82147 for any specific question regarding an accommodation.

COURSE INSTRUCTOR:

Professor Arash Reyhani
TEB 243
661-2111 ext. 81253
areyhani@uwo.ca