CMPE 415: Programmable Logic Devices

Instructor
Prof. Tinoosh Mohsenin
ITE 323
tinoosh@umbc.edu
410-455-1349

Lecture
Mon-Wed 2:30-3:45 pm

Office hours
After the class or by appointment

Webpage
Check frequently for class news, handouts, papers, and assignments at course website:
under http://www.csee.umbc.edu/~tinoosh/CMPE415

Prerequisites
CMPE 310- Systems Design and Programming

Grading: Letter
45% Homework/minor projects
20% Midterm Exam
30% Final Exam
5% Quizzes and Class Participation

Course Description
This course covers the concepts, structure and programming characteristics of programmable logic devices such as FPGAs. Hardware Description Languages (HDLs) are used to create designs that are tested on FPGA devices.

Major Learning Objectives
- Students learn the design flow and simulation processes associated with creating and verifying a design using Verilog and synthesizing it on FPGAs.

-Students learn Verilog syntax

-Students can write synthesizable code and can identify unsynthesizable code.

-Students know how to write and use a simulation testbench written in Verilog
- Students learn to use tools to synthesize code, inspect results using RTL and implementation views, run place-and-route tools, and verify timing constraints were met.

- Students learn about the architecture and different technologies of programmable logic devices (FPGAs).

- Students develop and understanding of the available prefabricated IP blocks on modern FPGAs and learn how to use them in their designs.

- Students learn how to write hardware descriptions for combinational blocks and sequential units including state machines in Verilog.

- Students learn to design FPGA to computer hardware interface

- Students learn to work with modern FPGA design tools including Xilinx ISE and Core Generator.

- Students integrate a system composed of a number of pre-designed blocks including memory, a small microprocessor or a state machine and required interfaces on a FPGA board and implement a data transfer/processing system.

**Exams and Quizzes**

There will be one or two mid-term exams (the number will be announced before the first exam) and quizzes will be given as necessary to monitor learning. No numerical equivalents of letter grades will be mandated in advance, though 90% or above will be guaranteed an A, 80%+ is at least a B, 70%+ is at least a C, and 60%+ is at least a D. Based on the difficulty of each exam, students will be advised what scores correspond to what letter grades. Both absolute and relative standards will be applied to determine your grade.

**Homework**

Students will perform regular homework. Though assignments enable me to assess the progress of students, the homework is primarily intended to provide hands-on learning and self-assessment. Assignments are valuable as a learning experience and I emphasize that more than the aspect of professor-student assessment. For instance, assistance and even answers are sometimes provided for some homework problems. Assignments may involve book-type problems, but in this course they will be heavily based on design, coding, simulation, and experimentation with an FPGA. This encourages traditional theoretical study and learning, as well as learning through design and true problem solving. Assignments are intended to teach and encourage extra study.

**Late work policy**

If assignment is reviewed in class, no credit is possible for late work. If assignment was not reviewed in class, there will be a 1/3 reduction of remaining credit per day (i.e., 100% -> 67%, 44% -> 30% ...).
Final Grading
If you feel you are falling behind, seek help immediately. To be fair to the most students, your grade will be based on performance during the semester in this class. If you miss an exam, quiz or homework you will lose the grade for it. Please do not expect/plan to email me after the semester asking me to reconsider the judgment for your grade except in extreme and unusual circumstances or if you think there is an accounting error. I can assure you I give an extreme amount of consideration and care during final grade assignment. Given my grading methodology, I don't believe it is a fair practice for me to selectively reevaluate, reconsider, and change grades upon request.

4.6. Academic Misconduct
All students are expected to be aware of all University policies on academic misconduct. All work a student presents, both homework and exams, must be his or her own exclusively unless otherwise directed. Any cheating or plagiarism will not be tolerated, and will subject the student to a grade of F or worse, without any warnings. Any false or misleading representations to the instructor will also be considered as academic misconduct. By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty and they are wrong. Academic misconduct could result in disciplinary action that may include suspension or dismissal. To read the full policy on academic integrity, consult the UMBC Student Handbook, Faculty Handbook or the UMBC Policies section of the UMBC Directory.

Textbook


Suggested references


*Verilog According to Tom* (available on course web page), Tom Chanak

*Quick Reference for Verilog HDL* (available on course web page), Rajeev Madhavan