ECE 645—Computer Arithmetic
Department of Electrical and Computer Engineering
George Mason University
Spring 2008

Lectures: Tuesday, 7:20 – 10:00 pm, Innovation Hall Room 207

Web Page: http://mason.gmu.edu/~dhwang/ece645/spring2008/

Instructor: Dr. David Hwang
Email: dhwang@gmu.edu
Office Hours: Wednesday, 3:30 – 5:30 pm, Science & Tech II, Room 229

Course Description

Covers computer arithmetic as applied to the design of general-purpose microprocessors, and application-specific integrated circuits for cryptography, coding, and digital signal processing. Focuses on efficient implementations of all basic arithmetic operations in three major domains: integers, real numbers, and elements of Galois Fields GF(2^n). Provides way of choosing between various hardware algorithms and architectures depending on primary optimization criteria, such as speed, area, and power consumption. Compares, contrasts best algorithms for implementing arithmetic operations in software and hardware.

Prerequisites

ECE 545 or permission of instructor. You are expected to be proficient with synthesizable VHDL as well as with using the FPGA CAD tools from ECE 545, e.g. Xilinx ISE, Aldec Active-HDL, Mentor Graphics Modelsim, etc. You are also expected to have an undergraduate level understanding of the C programming language and C compilers.

Required Textbook

Behrooz Parhami, *Computer Arithmetic: Algorithms and Hardware Design*, Oxford University Press, New York, 2000, ISBN: 0-19-51283-5.

Supplementary Textbooks

Milos D. Ercegovac and Tomas Lang, *Digital Arithmetic*, Morgan Kaufmann Publishers, 2004.
Isreal Koren, *Computer Arithmetic Algorithms, 2nd edition*, A. K. Peters, 2002, ISBN 1-56881-160-8.
Volnei A. Pedroni, *Circuit Design with VHDL*, The MIT Press, 2004, ISBN: 0-262-16224-5.
Sundar Rajan, *Essential VHDL: RTL Synthesis Done Right*, S & G Publishing, 1998.

Communication

Communication will be made from the instructor via email and the course web page. I will send emails to your official GMU email account; be sure to check this regularly or forward your GMU mail to an account you check regularly. Lectures will be posted on the web page for download by 3 pm on the day of class. Please check the web page regularly for course updates and announcements.

Grading

Your course grade will be determined by a combination of homeworks, projects, quizzes, and exams:

Homework	10%
Project 1	15%
Project 2	30%
Quizzes	20%
Final Exam	25%

Homeworks

Students are required to submit all homework assignments. No late homework will be accepted. Homeworks are to be completed individually.

Projects

Projects are to be completed individually or in groups of two (with more requirements for those in groups of two). No late projects will be accepted.

Quizzes

Quizzes will be taken in class at pre-announced times. They will be non-comprehensive and focus on a single topic or groups of related topics.

Final Exam

The final exam will be comprehensive and will test your knowledge on theoretical and mathematical concepts and will be taken in class.

Attendance

There is no explicit attendance requirement, but students are expected to attend all courses. If you are absent, you are responsible for turning homework on time and obtaining class notes from another student.

Students with Disabilities

Please talk with me to make arrangements to accommodate your needs.

Honor Code

All rules of the GMU Honor Code system will be in effect. All students should be familiar with the code and abide by its rules. Cheating is taken very seriously. If you violate the honor code, you will be reported to the honor committee and may face sanctions ranging from an F in the course to expulsion from GMU. The honor code (http://www.gmu.edu/catalog/apolicies/#Anchor13) states:

Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.