

ECE342: Computer Hardware

Course Information Sheet

Description

Computer Hardware (ECE342) course discusses the design of logic systems consisting both of hardware and software components. In this course, we continue the work began in ECE241 (Digital Systems) and discuss more advanced logic design techniques, covering multipliers, the use of Algorithmic State Machine charts to implement algorithms in hardware, and bus/interconnect interfaces. At the same time, we follow up on the topics covered in ECE243 (Computer Organization) and demonstrate how to build logic systems that contain both student designed hardware components and a processor. We conclude this course with digital logic testing techniques such as path sensitizing. To provide a valuable practical experience, the material introduced in this course is used in laboratories. There are six laboratory exercises in this course, ranging from fast multiplier design, through implementation of software algorithms as a hardware circuit, to the implementation of a computer system consisting of a student-designed simple processor and premade hardware components. This provides an experience of building a simple computer system from the ground up, covering the key concepts necessary to build such systems commercially. In each lab, students will use Verilog Hardware Description Language to implement their logic designs on a DE2 board. Some exercises will require students to also write assembly or C code when a processor is present in their design.

Laboratories

The second component of this course is a set of laboratory assignments that are to be completed within the scheduled time. There are 3 hours of lab time allocated per week for each section, with a total of 9 weeks of laboratories.

Textbook

Fundamentals of Digital Logic with Verilog Design, S. D. Brown and Z. G. Vranesic, McGraw-Hill Companies Inc.. Although the latest edition of the book is recommended, an earlier version will also be suitable.