

### Course Description

Digital technology has revolutionized our lives and has impacted how we carry out daily tasks. This course on digital systems will cover the foundations of digital technology from the gate level to the machine language level. Topics covered include: fundamentals of digital logic, computer arithmetic & Boolean algebra, basic components of digital circuits such as logic gates and flip-flops, information representation, Karnaugh map simplification, design of combinational and sequential circuits, Mealy and Moore model, finite state machine design, memory and programmable logic devices, CPU organization, arithmetic logic unit & control unit. Students will get their first taste of computer hardware and machine dependent programming. A special feature for this course is the introduction of VHDL and Verilog, examples of the hardware description language (HDL) that are at the center of modern digital design practice.

### Course Objectives and Student Learning Outcomes

The objectives of this course are to introduce the fundamentals of digital logic design and assembly language programming. At the end of this course, each student should: (i) understand the fundamentals of Boolean algebra (ii) understand logic gates and their operation (iii) be able to design minimized combinational logic circuits using Karnaugh-map simplification (iv) understand how signed integers are represented in a digital system (v) understand how addition and subtraction are performed in hardware (vi) understand the basic building blocks used in digital system design, such as decoders, encoders, multiplexors, latches, flip-flops, and registers (vii) be able to design a combinational logic system incorporating the above mentioned building blocks (viii) be able to design a finite state machine, allowing a real world problem to be solved using hardware (ix) design sequential circuits such as counters, and (x) describe hardware digital design using a hardware description language.

### Course Information

Website: <http://www.cse.buffalo.edu/faculty/bina/cse241/fall2013>  
 Instructor: Bina Ramamurthy (bina@buffalo.edu)  
 Lecture Time: MWF: 9.00-9.50AM  
 Lecture Location: Cooke 121  
 Office: Davis Hall 345  
 Office Hours: MWF: 10.10-11.10AM  
 Recitations:

11531	A1	M	10.00-10.50AM	Clemen 19
11668	A2	W	5.00-5.50PM	NSC 220
14830	A3	T	4.00-4.50PM	Bell 138
11670	A4	R	3.00-3.50PM	Norton 214

### Textbook and other material

Digital Design: With an Introduction to the Verilog HDL by M. Morris Mano and Michael D. Ciletti, Prentice Hall; 5 edition (January 12, 2012), ISBN-13: 978-0132774208

**Pre-requisites:** No specific CSE course is a pre-requisite for this course.

### Tentative Grading Distribution

Grades will consist of the following components:

Component (Quantity)	Percentage
Attendance	5%
Homework (8/10)	40%
Exams (2)	20% + 35%

Letter grade guideline will be as follows: 95-100: A, 90-94.99: A-, 85-89.99: B+, 80-84.99: B, 75-79.99: B-, 70-74.99: C+, 65-69.99: C, 60-64.99: C-, 55-59.99: D+, 50-54.99: D, <50: F.

I reserve the right to alter component weighting or provide a “curve” on an assignment as warranted.

**NOTE : → COMPONENT PASS POLICY ←** IN ORDER TO PASS THIS COURSE, YOU MUST HAVE PASSING WEIGHTED COMPONENT AVERAGES (WEIGHTED COMPONENT AVERAGES MUST BE GREATER THAN 49.99%) THERE WILL BE TWO COMPONENTS THIS SEMESTER. COMPONENT 1 IS THE EXAM COMPONENT CONSISTING OF THE TWO EXAMS. COMPONENT 2 IS THE HOMEWORK COMPONENT.

### **Exams (Note this is 55% of total grade)**

There will be two exams one of which will be administered and graded before the resign date. Exam material will cover all lecture and reading assignments before the exam, as well as concepts from the homework assignments. Exams are closed book, closed notes, and closed neighbor. No makeup exam will be given.

### **Homework (Note this is 40% of total grade)**

There will be several homework assignments during the semester. These will be assigned during the lectures and will be turned in a week after it is assigned. This will be turned in during the recitation. No late home works will be accepted. However we take the best 8 grades out of the 10 home works assigned.

### **Attendance Policy (5%)**

You are responsible for the contents of all lectures and recitations (your assigned section). If you know that you are going to miss a lecture or a recitation, have a reliable friend take notes for you. Of course, there is no excuse for missing due dates or exam days. We do, however, reserve the right to take attendance in both lecture and recitation.

### **Grading Policy**

All assignments will be graded and returned in a timely manner. When an assignment is returned, you will have a period of one week to contest any portion of the grade. The TA who graded your assignment will be the first person to resolve a grading conflict. If the conflict cannot be resolved, the instructor will mediate the dispute. The judgment of the instructor will be final in all such cases. When contesting a grade, you must be able to demonstrate how your particular solution is correct. Also, when contesting a grade, the instructor or TA reserves the right to re-evaluate the entire lab or exam, not just the portion in dispute.

### **Incomplete Policy**

We only grant incompletes in this course under the direst of circumstances. By definition, an incomplete is warranted if the student is capable of completing the course satisfactorily, but some traumatic event has interfered with their capability to finish within the timeframe of the semester. Incompletes are not designed as stalling tactic to defer a poor performance in a class.

### **Academic Integrity Policy**

UB's definition of Academic Integrity in part is, “Students are responsible for the honest completion and representation of their work”. It is required as part of this course that you read and understand the departmental academic integrity policy located at the following URL:

[http://www.cse.buffalo.edu/undergrad/policy\\_academic.php](http://www.cse.buffalo.edu/undergrad/policy_academic.php)

There is a very fine line separating conversation pertaining to concepts and academic dishonesty. You are allowed to converse about general concepts, but in no way are you allowed to share code or have one person do the work for others. You must abide by the UB and Departmental Academic Integrity policy at all times. Remember that items taken from the Internet are also covered by the academic integrity policy! If you are unsure if a particular action violates the academic integrity policy, assume that it does until you receive clarification from the instructor. If you are caught violating the academic integrity policy, you will minimally receive a ZERO in the course.

### **Accessibility and Support for student disabilities**

If you have special needs due to a disability, you must be registered with the Office of Disability Services(ODS). If you are registered with ODS please let your instructors know about this so that they can make special arrangements for you. Please see all the resources available for students at <http://www.student-affairs.buffalo.edu/ods/accommodations.php>