

**CMSC 201: Computer Organization (3 credits)**  
**Fall 2015**

**Instructor:** Robert Marmorstein, 395-2185, marmorsteinrm@longwood.edu

**Lecture:** 12:00pm-12:50pm(MWF), Ruffner 352

**Office Hours:** 10:00am-12:00pm MWTRF (Ruffner 329) or by appointment

**Course Web Site:** <http://marmorstein.org/~robert/Fall2015/cs201.html>

**Course Description:** The organization, design, and structure of computer systems, including both hardware and software principles. Topics include memory addressing, machine-level representations of software and data, fundamentals of logic design, and the mechanics of information transfer and control within a computer system.

**Prerequisite:** *CMSC 160; CMSC 162 recommended.*

**Textbook:** Computer Systems: A programmer's perspective, Randal E. Bryant and David R. O'Hallaron, Third Edition, Pearson, 2014, ISBN: 978-0134092669

**Course Objectives:** The student will discover the underlying principles of hardware design and how those principles affect programming practices and performance. The student will:

- analyze programs at the assembly code level
- convert data from numbers and text to binary formats
- build complex computational systems from simple circuits
- explain how system design affects software design and security

**Grading Policy:** Late work will not be accepted unless you have a medical condition which prevents you from completing the assignment on time (or a family/personal emergency which prevents you from doing the work). This includes the final and midterm exams, which must be completed on time to receive credit. Final letter grades will be based on the following scale:

	91-99% A	90% A-
89% B+	81-88% B	80% B-
79% C+	71-78% C	70% C-
69% D+	64-68% D	63% or below is an F

**Course Work:** Your grade will be determined by your performance on the final exam (25% of your grade), programming projects (50%) and homework problems/quizzes(25%).

**Attendance:** Missing more than 10% of scheduled class time will result in loss of one letter grade. Absences *for school events or illness* may be excused if you make arrangements with me within 12 hours of the missed class. Students who miss more than 25% of classes, for any reason, may at my discretion receive an F for the course in accordance with Longwood policy.

**Honor Code: Tests and quizzes must be completed entirely on your own.**

*You may freely discuss the programming projects with other students as long as:*

A. *You do not share code electronically.*

All the code you turn in should be code YOU have typed. You MAY write a few lines of code down on the marker board or a sheet of paper to make discussion easier **as long as you erase/dispose of the information before you leave the room.** You may NOT share printouts of your code, transmit code by e-mail, send pictures of code by phone or e-mail, or post code on the web.

B. *You do not copy large blocks of code.*

Sharing a block of three or four lines is acceptable. It is also okay to point out a syntax or semantic error in someone else's file. However, sharing an entire program or a non-trivial function is an honor code violation.

C. *You may use Internet resources as long as you follow the above guidelines.*

That is, you must type out the code for yourself (you can't just download or copy/paste it) and you should only use small blocks of code (four lines or fewer) that you've found online.

You may also discuss homework problems as long as your answers are your own. Infractions of this policy will be dealt with under the Longwood Honor Code. A student convicted of an Honor Code offense involving this class **will receive a grade of F** for the course in addition to any penalties imposed by the Honor board. All work completed in this class is considered to be pledged, whether or not the pledge appears on the assignment itself.

**Reminder:** It is also an honor code violation not to report an honor code violation which you have witnessed.

**Cell Phones and Laptops:** All cell phones and laptops are to be turned off and put away during class. Violations may be considered an unexcused absence.

**Food and Drink:** Please do not eat in class (it distracts me and the other students). You may bring water or other non-alcoholic beverages to class. I occasionally make exceptions to this rule for students who would otherwise miss lunch or have medical needs that require them to eat in class. If you feel that you need such an exception, you **MUST** make arrangements with me before you bring food to class. Violations of this policy will be considered an unexcused absence.

### **Tentative Course Schedule:**

Week1 (Aug. 24-28) Principles of Computer Organization, Bits, Bytes, Integers,  
Floating Point

**Read Chapters 1 and 2 (through Section 2.3)**

Week 2 (Aug. 31 - Sept. 4) Bit-wise, logical, and arithmetic operations, overflow, shifting,  
Truth Tables, Basic Logic Circuits

**Read Section 2.4**

**Aug. 31**

**Last Day to Drop (by 5pm)**

Week 3 (Sept. 9-11) Breadboarding, Electronics, Laws of Logic

Week 4 (Sept. 14-18) Multiplexers and Decoders, Full and Half Adders

**Data Lab Due**

Week 5 (Sept. 21-25) Introduction to Assembly Language, Registers, Arithmetic,  
Control Statements, and Procedures

**Read Sections 3.1-3.7**

Week 6 (Sept. 28-Oct. 2) Data Representation: Structs, Arrays, Pointers,  
Buffer Overflow

**Read Sections 3.8 through 3.12**

Week 7 (Oct. 5-9) CPU and ALU, the Fetch-Decode-Execute cycle

**Read Chapter 4, Sections 4.1 through 4.3**

**Bomb Lab Due**

**Oct. 12-13**

**Fall Break**

Week 8 (Oct. 14-16)

Pipelining

**Read Chapter 4, Sections 4.4 through 4.6**

**Buffer Lab Due**

**Oct. 14**

**Deadline to Withdraw without an F**

Week 9 (Oct. 19-23) Microcontrollers (Arduino and Raspberry Pi)

Week 10 (Oct. 26-30)	Code Optimization <b>Read Chapter 5</b>
Week 11 (Nov. 2-6)	Memory Circuits <b>Read Chapter 6, Sections 6.1-6.2</b>
Week 12 (Nov. 9-13)	The Memory Hierarchy, Caching <b>Read Chapter 6, Sections 6.3-6.7</b>
Week 13 (Nov. 16-20)	Disks, Capacity, Elevator Algorithms <b>Performance Lab Due</b>
Week 14 Nov. 23	Parallelism and Amdahl's Law
<b>Nov. 25-27</b>	<b>Thanksgiving Break</b>
Week 15 (Nov. 30-Dec. 4)	Catchup and Review
<b>Dec. 7</b>	<b>Final Exam (Monday, 11:30am-2:00pm)</b>