

CMSC 201: Computer Organization (Fall 2018)
<http://marmorstein.org/~robert/Fall2018/cs201.html>

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

Office Hours:

2:00pm – 4:00pm MWF (Ruffner 329)

3:15pm – 4:00pm TR (Stevens 118)

or by appointment (please e-mail me at least 24 hours in advance)

Lecture (Ruffner 354): 12:00pm-12:50pm(MWF)

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. 3 credits.

Prerequisite: *CMSC 140 or 160 AND either CMSC 201 or ISCS 371.*

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

Course Student Learning Outcomes: By the end of the course, the successful student will be able to:

- describe the representation of data values in binary and hexadecimal
- analyze software at the assembly code level
- build complex computational systems from simple circuits
- explain ways in which system design affects software design, security, and performance

Course Structure and Student Expectations:

This is a lecture-driven course with significant lab and reading components. In addition to regular attendance at lecture, you should expect to spend roughly six hours a week reading the textbook, completing projects, and working on homework exercises.

Tests: The only exam in this course will be the final exam. It will be a comprehensive exam covering all substantive topics of the course.

Projects: There will be at least four projects in this course. Please see the tentative schedule below for due dates.

Quizzes and Homework Problems: In addition to weekly or bi-weekly homework assignments, I will give unannounced (pop) quizzes over topics from the reading assignments.

Course Requirements: Your grade will be determined by your performance on the **final exam (25% of your grade)**, **course projects (50%)** and **homework problems/quizzes (25%)**. See the tentative schedule below for due dates.

Attendance:

This class is heavily lecture-driven and will require your regular attendance. I expect you to attend class unless you are sick or engaged in a school sponsored sports event or extra-curricular activity. In accordance with Longwood policy, missing more than 10% of scheduled class time will result in loss of one letter grade. Absences for school events, illness, or exceptional circumstances 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.

Grading Policy:

Late work will not be accepted unless you have a medical condition or family emergency which prevents you from completing the assignment on time. In such circumstances, you do not need a doctor's note, but you must contact me by e-mail at least 12 hours before the assignment is due to explain the circumstances and arrange to make up the work. Such exceptions are granted very rarely. Of course, you may also apply slip days to extend your projects, if you have them. You do not need to contact me in order to use slip days. Technical problems involving the use of the submit system, your computer, or lab resources are not valid reasons to submit work late (that is what slip days are for). Final letter grades will be based on the following scale:

	A: 91 – 100%	A-: 90%
B+: 89%	B: 81 – 88%	B-: 80%
C+: 79%	C: 71 – 78%	C-: 70%
D+: 69%	D: 64 – 68%	F: 0 – 63%

(Note: there is no grade of D- in this course)

Cell Phones and Laptops:

Cell phones, music players, and laptops must be turned off and put away during lecture and class discussions unless I have specifically requested that you use them. Violations of this policy will be considered an unexcused absence and may also affect your homework or participation grades.

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 (preferably by e-mail). Violations of this policy will be considered an unexcused absence and may also affect your homework or participation grades.

Mental Health, Disabilities, and Sexual Assault:

I follow Longwood's campus policies on Mental Health, Disability Accommodation, and Mandatory Reporting of Sexual Assault and Other Crimes. Please see <http://www.longwood.edu/academicaffairs/syllabus-statements/> for the complete policy.

Honor Code:

I take the honor code very seriously. I encourage you to take advantage of the freedom it gives you to collaborate with other students and to use print and Internet resources to better understand the material.

Because it is possible to abuse these resources in a way that actually hinders you from learning or disadvantages other students, I have established some guidelines for their use that you **MUST** follow.

Please read these rules carefully. It is your responsibility to know them and follow them.

Exams and quizzes are to be completed entirely on your own. They will be closed book/closed notes exams on which you may receive no external help and may use no resources other than your brain and a writing instrument (unless explicitly stated in class).

On homework and lab projects, you may discuss your work with other students subject to these restrictions:

1. Turn in only your own work

The work you submit should, in general, be your own original work or material which I have provided and you have suitably modified. You **MAY** discuss problems with others in a general way. You **MAY** assist other students (or get assistance) with simple problems like syntax errors, but you **MAY NOT** copy solutions or large blocks of code from each other.

On projects, a good guideline of what "large" means is that copying one or two lines of code is usually okay, but copying a complete function or more than three complete statements is usually too much.

The purpose of this rule is to ensure that you understand the code or answers you are submitting. If you don't think you could explain your work to me without help or looking at a book or web page, you probably should not submit it.

2. Do not copy code electronically

Any work you turn in should be work which YOU have typed or hand-written.

This doesn't mean you can't look online for help with a project. It does mean that you must re-type any code you find and not download it or copy/paste it.

You may not share code with other students using flash drives, cell phones, e-mail, web sites, floppies, CDs, or any other electronic storage or communication device unless you are both assigned to the same group for a project. You may not print out copies of your code to share with other students (personal copies or copies to bring to office hours are fine as long as you don't leave them lying around the lab).

Feel free to discuss projects and homework using the markerboard - just be sure that when you are done you erase your work before you leave the room. Do NOT take pictures of such code on your phone.

3. Give proper attribution

Whenever you use any kind of resource (including other people), you should give credit to your source. On homework assignments, simply add a note in the margin next to the answer on which you received help. In code, you should add comments to give proper credit. A simple comment like

```
/* Based on http://codewarrior.com */
```

or

```
// Susan helped me with this step
```

is fine. The comment should go directly above the line or lines on which you received help to make it clear which parts of your program are original and which are derived from other sources. You do not need to cite help you have received directly from me or from the textbook.

4. You are responsible for securing your code.

Helping other students to cheat is also cheating. Furthermore, it is your responsibility to make sure that other students do not use your work to cheat. Be careful with who you let access your computer and report any missing files, flash drives, or other devices to me promptly.

Infractions of these policies will be dealt with harshly under the Longwood Honor Code. Any student convicted of an honor offense involving this class will automatically receive a final course grade of **F** in addition to any penalties imposed by the Honor Board. You should consider all work in this class to be pledged work, whether or not the pledge appears on the assignment.

Tentative Course Schedule:

Week1 (Aug. 20 – 24)	Principles of Computer Organization, Basic Logic Circuits, Truth Tables and the Laws of Logic, Breadboarding and Electronics Read Chapters 1 and 2 (through Section 2.2)
Aug. 27	Last Day to Drop (by 5pm)
Week 2 (Aug. 27 – 31)	Bits and Bytes, Units of Memory and Computation, Bitwise and Logical Operations, Two's Complement Arithmetic, Arithmetic Overflow, Shifting and Casting Read Section 2.3
Sept. 3 Sept. 5	LABOR DAY: NO CLASS Project Work Day: NO CLASS
Week 3 (Sept. 7)	Floating Point, Read Section 2.4
Week 4 (Sept. 10 – 14)	Multiplexers and Decoders, Full and Half Adders Read Sections 3.1 – 3.3, Data Lab Due
Week 5 (Sept. 17 – 21)	Introduction to Assembly Language, Registers, Arithmetic, Control Statements Read Sections 3.4 – 3.7
Week 6 (Sept. 24 – 28)	Data Representation: Structs, Arrays, Pointers, Buffer Overflow Read Sections 3.8 through 3.12, Assembly Language Lab Due
Week 7 (Oct. 1 – 5)	CPU and ALU, the Fetch-Decode-Execute cycle Read Sections 4.1 – 4.3
Week 8 (Oct. 8 – 12)	Pipelining Read Sections 4.4 – 4.6, Bomb Lab Due
Oct. 15 – 16	FALL BREAK: NO CLASS
Week 9 (Oct. 17 – 19)	Micro-controllers (Arduino and Raspberry Pi)
Week 10 (Oct. 22 – 26)	Catchup and Review, Read Chapter 5
Oct. 31	Deadline to Withdraw without an F (by 5 pm)
Week 11 (Oct. 29 – Nov. 2)	Memory Circuits Read Sections 6.1 – 6.2, Attack Lab Due
Week 12 (Nov. 5 – 9)	The Memory Hierarchy, Caching Read Sections 6.3 – 6.7
Week 13 (Nov. 12 – 16)	Disks, Capacity, Elevator Algorithms
Week 14 Nov. 19	Parallelism and Amdahl's Law
Nov. 21 – 23	THANKSGIVING BREAK: NO CLASS
Week 15 (Nov. 26 – 30)	Catchup and Review Final Exam (Monday, 11:30am-2:00pm)
Dec. 7	