Computer Organization
CS232, Spring 2012

| Instructor     | Dr. Brian S. Eastwood  
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|                | 859-5852  
| Lectures       | Monday, Wednesday, Friday  
|                | 9:00 am – 9:50 am, Roberts 221  
| Web site       | http://cs.colby.edu/courses/F12/cs232/  
| Text           | William Stallings,  
|                | Computer Organization and Architecture, 8th Edition,  

**Description**

Computer organization focuses on how computers work. Students learn the fundamental hardware components, including storage (RAM, hard disks), input/output mechanisms, and the central processing unit (CPU). They learn how computer components are designed and built on several levels, including the design of the electrical component, machine language, and assembly language. They also learn to program in assembly language for one or more simple computer processors. Students learn primarily through projects where they design digital circuits, design components of a CPU, or write programs in assembly language.

**Prerequisites:** CS151

**Objectives**

1. Students understand standard binary encodings of data and programs.
2. Students understand the basic electronic components that make up a computer.
3. Students understand the computer at various layers, including the hardware layer, the machine language layer, and the assembly language layer.
4. Students are able to write assembly language programs for a simple CPU.
5. Students understand the significance of new technology in computer science.
**Grading**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Projects (7 – 8)</td>
<td>35</td>
</tr>
<tr>
<td>Midterm Exams (2)</td>
<td>30</td>
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<tr>
<td>Final Exam</td>
<td>15</td>
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<tr>
<td>Quizzes</td>
<td>10</td>
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<tr>
<td>Homework &amp; Participation</td>
<td>10</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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**Homework & Participation.** Approximately weekly homework assignments will consist of problem sets, writing, and short programming exercises. Homework is due by class time on the given due date. Because these assignments will typically be discussed in class, late homework is not accepted. You are encouraged to discuss the homework concepts with your classmates, but the work you submit must be your own. Homework is graded on a done/not done basis; remember to turn your homework in at the beginning of class the day it is due.

Active participation in the classroom is a critical component of education, and this depends on each student arriving at class prepared and on time. You are expected to attend all classes, and class participation forms a component of your grade. Extreme cases of absenteeism may result in failure of the course. You are expected to have completed any reading that will be discussed in the upcoming class and you are responsible for all information covered in class, whether or not you are there.

**Quizzes.** There will be a 5 – 10 minute quiz in class each Friday. The lowest one or two quiz grades will be dropped.

**Projects.** Several substantial programming projects will be introduced in the laboratory component of the course. These projects will involve a mixture of hardware design and simulation using software as well as building computer components using a field programmable gate array (FPGA).

The grading policy on projects is that the tasks specified explicitly in the project description will constitute about 85% of the assignment. If you complete the specified parts of the project properly, and produce a high quality write up, it's worth up to a B grade. In addition, the project description will include a variety of extensions, or you can come up with your own. The complexity and quality of the extensions will be incorporated into the final grade for the project.

Each assignment has a written component in which you will reflect on the problem you are solving and the effectiveness of your solution. This should be completed on your personal wiki page or a personal web site (you are free to choose), and a link to this page should be sent to the instructor. Do not post complete code or design files on your website. The code for assignments should be submitted to the instructor via email (use a single zip file). The write up should include a description of the problem, a discussion of any required theory, a presentation of the results, and a discussion including possible enhancements.

For full credit, assignments should be submitted by 11:59:59 pm on the due date. You will typically have twice as much time as you need to complete each project; it is your responsibility to budget your time appropriately. Late assignments will incur a 10% penalty per calendar day up to a maximum of 8 days.
Exams. There will be two in-class midterm exams and a cumulative final exam. The midterm exams are tentatively scheduled for **Wednesday 7 March** and **Wednesday 11 April**. The final exam period for this class is **Thursday, 10 May 2012 at 6:00 pm**.

**Collaboration.** You are encouraged to discuss homework and projects with your classmates. The work you submit, however, must be your own. Good scholarship requires that all collaboration must be acknowledged. If you collaborate on the solution of a problem set or project, I expect that you list your collaborators. Additionally, whenever you use a source in any way, that usage must be documented in the assignment turned in. Sources include books, articles, magazines, the Internet, and communication with other people.

**Schedule**

A tentative schedule is available on the course website; this will be updated to include reading assignments.