Course Syllabus

Professor: Chris Lupo  
Office: 14-214  
Email: clupo@calpoly.edu  
Website: [http://www.csc.calpoly.edu/~clupo/teaching/315/spring14](http://www.csc.calpoly.edu/~clupo/teaching/315/spring14)

Lecture
- Section 1: MWF 2:10–3:00 PM, Room 21-235
- Section 3: MWF 4:10–5:00 PM, Room 10-221

Lab
- Section 2: MWF 3:10–4:00 PM, Room 14-301
- Section 4: MWF 5:10–6:00 PM, Room 14-301

Office Hours
- Monday: 12–12:30 PM
- Wednesday: 11 AM–12:30 PM
- Thursday: 1:30–4 PM
- Friday: 12–12:30 PM
- Or by appointment

Course Objectives

1. To understand instruction set architecture and hardware design of a specific CPU.
2. To understand pipelining.
3. To understand memory hierarchies, including caches.
4. To understand virtual memory.
5. To understand input/output mechanisms.
6. Be introduced to multi-processors.
7. Be able to compute and measure performance of a computer system.

Prerequisites

CPE 229/269 ∨ CPE 233 ∨ CSC 225.

Special Note for Spring ’14

Both of my sections of CPE 315 offered this quarter are **significantly different** than any prior offerings of CPE 315 at Cal Poly. Materials from prior quarters *won’t help you* this quarter. That’s the bad news, you’re going to have to learn something new in this class. The good news is that you get to learn some pretty cool, brand new material.

This course, in my opinion, has been in desperate need of updating. You get to be part of that upgrade! We’re using cool hardware (Raspberry Pis) to learn about an incredibly relevant microprocessor architecture (ARM). One consequence of all this newness/coolness, is that the labs aren’t completely polished and free of issues. There will be technical glitches, to be sure. However, you will never be penalized for problems that should have been dealt with on my end. I only ask for your patience and understanding in what will surely be a remarkable quarter.
Equipment

We will be working directly with Raspberry Pis in this class. I have enough equipment to loan to each section of CPE 315 with students working in teams of two (2). Each team will be loaned the following equipment for the quarter:

- 1 Raspberry Pi (rev. B)
- 1 clear acrylic case
- 1 USB power cable
- 1 8 GB SD Card
- 1 HDMI to DVI cable

We will use keyboards and monitors in the lab. If you wish to work alone, you must purchase your own equivalent equipment, no exceptions. Your final grade in this course will not be entered until all equipment loaned to your team has been returned. The total cost for this equipment is approximately $50–$60.

Required Texts

There are no required textbooks for this course. Notes and reading assignments will be distributed through the course website.

Electronic Resources

All class material will be posted on my website. You are strongly encouraged to check the course website often, as all assignments, study guides, and important dates will be posted there. Course notes that are posted will not contain all the information presented in class, and you will be responsible for all material presented in the lectures.

We will also be using Piazza (piazza.com) to facilitate discussion in this class. I expect that this will be particularly useful in the setup and configuration of the new hardware and software environment. It also means that you may get your problems resolved faster by your peers than by the instructor or grader.

Grading

Weighting

5% – Homework  Approximately 5 assignments. Homework is required and graded for completeness but not accuracy. However, the quizzes, midterm and final exams will draw heavily from the homework material; the homework is good practice for exams. You may work on homework in groups, but make sure that you try to solve the problems yourself before getting help from others. This is your practice for the tests! Take it seriously!

30% – Lab Assignments  Your lab scores will consist of the following components.

   Demo/Handin  A working lab solves the problem and handles every test case input correctly.

   Write-up  Lab write-ups/reports should answer any questions posed in the lab problem description. Your write-ups are due at the same time as the rest of the lab material.

Labs are to be the sole effort of you and your lab partner.

20% – Quizzes, lowest quiz score will be automatically dropped.

20% – Midterm
25% – Final Exam

Grade curving, if any, will be based on the overall course outcomes, not individual exams, labs or programs.
Lateness
50% off for first day late. No credit after 1 day late. (Weekends count as 1 day). Deadlines are an important lesson that will continue in your professional careers.

Course Policies

Right to Change Syllabus
I reserve the right to make any changes to this syllabus at any time during the course. If I do make changes, you will be notified, and the changes will be posted.

Cheating
Cheating or any other form of academic dishonesty will not be tolerated in this course. Students caught cheating will be referred to Student Affairs, and will have the maximum penalty imposed. You are responsible for making yourself aware of Cal Poly’s cheating policy, which can be found at: [http://academicprograms.calpoly.edu/academicpolicies/Cheating.htm](http://academicprograms.calpoly.edu/academicpolicies/Cheating.htm)

Students with Learning and/or Physical Disabilities
Any student with a learning and/or physical disability who needs accommodations or assistance in this course should meet with me as soon as possible.

Cell Phones and Other Personal Communication Devices
Cell phones and other personal communication devices (i.e. laptops, tablets, smart watches, smart glasses etc.) are strictly prohibited during exams and quizzes unless explicit permission is given. No, they cannot be used as calculators. If you are identified using such a device during an exam or quiz, you will receive a zero on that exam/quiz. During class time please be respectful of everyone else’s learning environment, and turn your device to silent mode. Please also be respectful of my time, and use computers only for taking notes and other academic activities. Catch up on your favorite videos and social media on your own time!

Exams
No makeups will be given for quizzes or exams, no exceptions. Your lowest quiz score will be dropped. The midterm and final must be taken at the appointed time. In the event of a compelling reason where you must miss an exam (e.g., illness, emergency, or another reason as determined by Student Affairs), you must contact me prior to the exam. your other exams will be weighted accordingly.

Example: If you miss the midterm, The final will be weighted to accommodate that proportion of your grade.

Cases where more than one exam is missed will be handled on a case-by-case basis.

I reserve the right to regrade entire exams or quizzes in the event of a request for a regrade. Regrade requests must be in writing, and must be given to me within one week of the time the exam/quiz was returned to you.

Classroom Civility
You are expected to behave professionally and respectfully to both the professor and your classmates. Persons being disruptive will be asked to leave.
FERPA

I will respect your FERPA rights. My policy is to discuss your grades only with you, and only in person. No grades will be given over the phone or by email. No person other than yourself will be allowed to pick up assignments or exams. To facilitate the class, I may call on you by name. If this is a problem, it is your responsibility to notify me by the end of the first week.

Keys to Success

Show up for every class. Listen. Try your best at everything (assignments, labs, quizzes, exams). Start early. Ask questions. Come to office hours. Study 6–10 hours per week for this class. Don’t let me be the first to test your knowledge, test yourselves! Have fun! Be enthusiastic! Ask questions! This class will be memorable (the good kind) if you do.

Tentative Lecture Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/31</td>
<td>Cesar Chavez Holiday - No Class</td>
</tr>
<tr>
<td>4/2</td>
<td>Welcome – Intro. and Syllabus</td>
</tr>
<tr>
<td>4/4</td>
<td>Stack Frames – Calling Conventions</td>
</tr>
<tr>
<td>4/7</td>
<td>Computer Arithmetic</td>
</tr>
<tr>
<td>4/9</td>
<td>Performance</td>
</tr>
<tr>
<td>4/11</td>
<td>Performance Quiz 1</td>
</tr>
<tr>
<td>4/14</td>
<td>Compiler Optimizations – ILP</td>
</tr>
<tr>
<td>4/16</td>
<td>Single Cycle Datapath</td>
</tr>
<tr>
<td>4/18</td>
<td>Pipelines Quiz 2</td>
</tr>
<tr>
<td>4/21</td>
<td>Pipelines</td>
</tr>
<tr>
<td>4/23</td>
<td>Data Hazards</td>
</tr>
<tr>
<td>4/25</td>
<td>Control Hazards</td>
</tr>
<tr>
<td>4/28</td>
<td>Pipeline Wrap-up Quiz 3</td>
</tr>
<tr>
<td>4/30</td>
<td>Midterm Prep – Q&amp;A</td>
</tr>
<tr>
<td>5/2</td>
<td>Midterm – Covering up to 4/30</td>
</tr>
<tr>
<td>5/5</td>
<td>Caches</td>
</tr>
<tr>
<td>5/7</td>
<td>Caches</td>
</tr>
<tr>
<td>5/9</td>
<td>Cache Wrap-up</td>
</tr>
<tr>
<td>5/12</td>
<td>Virtual Memory Quiz 4</td>
</tr>
<tr>
<td>5/14</td>
<td>Virtual Memory</td>
</tr>
<tr>
<td>5/16</td>
<td>Virtual Memory</td>
</tr>
<tr>
<td>5/19</td>
<td>I/O</td>
</tr>
<tr>
<td>5/21</td>
<td>I/O</td>
</tr>
<tr>
<td>5/23</td>
<td>I/O Quiz 5</td>
</tr>
<tr>
<td>5/26</td>
<td>Memorial Day Holiday - No Class</td>
</tr>
<tr>
<td>5/27</td>
<td>Virtual Monday! Multicore and Parallelism</td>
</tr>
<tr>
<td>5/28</td>
<td>Multicore and Parallelism</td>
</tr>
<tr>
<td>5/30</td>
<td>Multicore and Parallelism Quiz 6</td>
</tr>
<tr>
<td>6/2</td>
<td>Architecture Potpourri</td>
</tr>
<tr>
<td>6/4</td>
<td>Architecture Potpourri</td>
</tr>
<tr>
<td>6/6</td>
<td>Wrap-up and Review</td>
</tr>
</tbody>
</table>

All dates and topics are subject to change.