**EE 346 Lab Guidelines**

**Microprocessor Principles and Applications**

**Instructor:** Christopher Hirunthanakorn

**Office:** ECS - 501

**Email**: [c.hirunthanakorn.us@ieee.org](mailto:c.hirunthanakorn.us@ieee.org)

**Office Hours:** **Monday (ECS-509) from 12 to 1 PM**

**Wednesday (ECS-501) from 12 to 1 PM**

**Tu/Th (ECS-501) from 2 – 3 PM**

**Lab Materials**

As stated in the course syllabus, you will need the following materials for the labs.

|  |  |
| --- | --- |
| **Hardware** | **Software** |
| Arduino Uno | [AVR Studio 4](http://web.csulb.edu/~hill/ee346/Labs/AvrStudio4Setup.exe) or [Atmel Studio 7](http://studio.download.atmel.com/7.0.1931/as-installer-7.0.1931-web.exe) (Windows only) |
| CSULB Shield | [WINAVR](https://sourceforge.net/projects/winavr/) (drivers) |
|  | [Arduino IDE](https://www.arduino.cc/en/Main/Software) (Optional) |

You can purchase the Arduino Uno from several sources ([Official site](https://store.arduino.cc/usa/arduino-uno-rev3), [Sparkfun](https://www.sparkfun.com/products/11021), [Amazon](https://www.amazon.com/Arduino-Uno-R3-Microcontroller-A000066/dp/B008GRTSV6/ref=sr_1_4?ie=UTF8&qid=1535485732&sr=8-4&keywords=arduino+uno+r3), etc). The CSULB Shield is sold by Professor Hill and orders are taken during the first week of the semester. The total cost for the shield is $35, with a $20 deposit when the order is placed. You will have to solder the parts together and the instructions for that can be [found here](http://web.csulb.edu/~hill/ee346/How_to_Build_CSULB_Shield.pdf).

You can download the software from the links provided. The Ardunio IDE is optional because we will not be using it for creating the assembly labs but it can be used to upload the Arduino version of the labs and visually see the expected output. Make sure to install both AVR Studio 4 **AND** WINAVR.

**Grading**

The lab grade accounts for 30% of your final grade in the class. There are a total of 7 prelabs and 6 labs to be turned in. The value and due date for those assignments are listed below. There is a bonus lab due at the end of the semester to make up for any lost points.

Prelabs – 10 points maximum

Labs – 20 points maximum with successful completion of design challenges (exceptions are Lab 5 and 6)

|  |  |
| --- | --- |
| **Assignment** | **Due Date** |
| Prelab 1 | September 4th |
| Lab 1 | September 11th |
| Prelab 2 | September 11th |
| Lab 2 | September 25th |
| Prelab 3 | September 25th |
| Lab 3 | October 9th |
| Prelab 4A | October 9th |
| Prelab 4B | October 23th |
| Lab 4 | October 30th |
| Prelab 5 | October 30th |
| Lab 5 | November 27th |
| Prelab 6 | November 27th |
| Lab 6 | December 11th |
| Bonus Lab | December 11th |

**All prelab and lab reports are to be *submitted at the beginning of lecture* to the professor.**

If an assignment is turned in during the lab, it will be deducted one point. All late labs submitted after lab will be deducted two points from the maximum for each week they are late.

**Lab Formatting**

The formatting for prelabs is left up to the student. The only requirements are that the questions being answered are clearly indicated and the figures or tables are legible. Certain pages can be changed to landscape format if it helps to fit the figures or tables.

Lab reports have a very specific structure.

***Assisting your friends in understanding how to code in assembly is acceptable but LAB SHARING is forbidden and will result in a grade of F for the lab.***

***College of Engineering DOES NOT tolerate any kind of cheating / plagiarism. The consequences are irreversible.***

### Plagiarism

***COE has a zero-tolerance policy for cheating or plagiarism.*** *Note:* Any time another person’s work is used without giving them proper credit, it is considered plagiarism and cheating. Any individual caught cheating on quizzes, exams, homework, or lab projects will be punished. At the instructor’s sole discretion one or more of the following actions may be taken.

* A requirement that the work be repeated;
* Assignment of a score of zero (0) for the specific demonstration of competence, resulting in the proportional reduction of final course grade;
* A reduction of one letter grade from your final course grade
* Assignment of a failing final grade;
* Referral to the Office of Judicial Affairs for possible probation, suspension, or expulsion.

The official CSULB Policy on Cheating and Plagiarism can be found here: <http://web.csulb.edu/divisions/aa/catalog/current/academic_information/cheating_plagiarism.html>

**Additional Help and Useful links**

For additional help with the simulator in AVR Studio 4, take a look at this [simulation tutorial](http://web.csulb.edu/~hill/ee346/Labs/Simulation%20Tutorial.pdf).

The [programmers reference card](http://web.csulb.edu/~hill/ee346/Labs/CSULB%20Shield/Lab02/Programmers%20Reference%20Card%20HiRez.jpg) will be invaluable for lab demonstrations and visually understanding what is happening in the labs.

The essential details about the assembly instructions, registers, and other information about the Atmega 328p can be found [here](http://web.csulb.edu/~hill/ee346/Reference/ATmega328P%20Summary_8161S.pdf).