West Virginia University - College of Engineering and Mineral Resources

Lane Department of Computer Science and Electrical Engineering

CpE 311 MICROPROCESSOR SYSTEMS LABORATORY
Spring 2015 SYLLABUS

Instructor:

Stuart Christie

Office Hours: Make an appointment by email. You can often find me in the lab (ESB 925) during the week. Always feel free to knock on the door if the light is on.

Office: ESB 901 Desk #3
Email: schrist4@mix.wvu.edu

Meeting Location:

ESB 925

Meeting Times:

Tuesday	6:30pm – 9:20pm	Section 003
Wednesday	5:00pm – 7:50pm	Section 002
Thursday	2:00pm – 4:50pm	Section 001

Course Description:

Course CPE 311, entitled Microprocessor Systems Laboratory, is the laboratory supplement for CPE 310. Experiments for this lab course involve assembly language programming and hardware and software interfacing. Students will work in two person groups assigned by the lab instructor for each laboratory project. Experiments will use the Intel (80x 86 family of microprocessor.) This will be via Single Board Computer (SBC) from a company called Octagon. This SBC will be connected to a PC through a serial port so that programs can be assembled on the PC and downloaded into the SBC for execution. Programs will be developed using a cross-assembler, which will be the program known as MASM 6.11, on the PC. In interfacing experiments, the student will be using LED's, switches, and other electronic devices.

Course Requirements:

To be enrolled in CpE 311 it is mandatory that the students have completed the pre-requisites for CpE 310, which are CpE 271 and PHYS 112. It is also recommended that EE AND CpE students complete Digital Electronics (EE-251) before taking this course and lab.

Book/Other Requirements:

All students should have the books required for CpE-310 PLUS they should already have the lab kit required for CpE-271/272. The lab kit for CpE 311 must contain at minimum the following components: a three strip breadboard, two BNC to alligator clip cables, one BNC to BNC cable, wire strippers, small flat-head screwdriver and pliers.

Course Goals:

The goals of this course are to support CpE-310 and provide students with the practical ability to use assembly language programming on a real embedded machine and understand its relationship to computer architecture. In addition, an introduction to basic techniques in microprocessor interfacing will be examined.

Student Learning Objectives:

The student shall be able to:

- Write assembly language programs.
- Debug assembly language programs.
- Carry out design of assembly language based software and operate input/output systems with that software.
- Integrate software and hardware components into running projects in the lab.
- Verify and debug hardware using laboratory test equipment.
- Write documentation for hardware and software.

Course Rules:

1) Attendance in laboratory sessions is **REQUIRED**. If a lab is missed, make up lab sessions will only be given for University approved functions and must be arranged ahead of time with the lab instructor. **YOU MUST EMAIL BEFOREHAND IF YOU WILL MISS LAB!!!**

2) A written lab report is **REQUIRED** of EACH member of the lab group. Identical submissions will result in a zero for the lab for the parties that turn in the identical documents. Every lab report is to be submitted to the instructor before the due date. (Typically lab reports are due one week following the experiment.) The grade for a late lab report will decrease by 10% per day. Lab Reports will not be accepted more than one week late.

3) At the end of the semester a lab portfolio, **MUST BE** submitted by each student. This portfolio must contain all information that is given out during the semester including every week's lab handout, every graded lab report and any other notes taken by the student during class. This is a **MANDATORY** part of the class and counts as 10% of the class grade.

4) Grading of the experiments and lab reports will be conducted based on a separate grading rubric in each lab experiment handout. An example of such rubric is given below.

	A Excellent	**B** Good	**C** Average	**D** Fair	**F** Poor
Documentation and Report	Excellent organization, well documented, and neat	Good organization but not clear that writer understands the solution	OK organization, documentation somewhat confused,	Poorly organized, hand written, poorly put together	No organization
Operation	Works perfectly	hardware or software only works.	software seems to work but hardware does not, or vice versa	neither hardware nor software works completely	Nothing works at all
User Interface	Neat hardware that is Easy to use and clearly shows operation	Parts seem to work and user can use but not all clear.	Works but user can only use pieces and not clear what is being done	user can not use it but writer seems to be able to demonstrate it.	Nothing to demonstrate

5) The letter grades will be converted to percentages using 0-4 scale, i.e. if your grade is A (Documentation and Report), B (Operation) and A (User Interface), then the total lab grade is 92 ([(4+3+4)/12]*100%). Semester grades will be computed as follows:

Laboratory experiments and reports:	60%
Lab Portfolio:	10%
Final Project:	20%
Final Test:	10%

Laboratory Report:

A Laboratory report will be required after the completion of each laboratory assignment. Every student must hand in an individual report. Members of the same group may share the design but they must have their own, individual answers and conclusions, including any answers to post lab questions. The goal of this report is to clearly describe the **ENTIRE** process that took place in lab, including all design decisions. The report should describe **HOW** and **WHY** things were done, and provide an **ANALYSIS** of the results. Reports that simply state what was done without including how and why will not be accepted.

A formal lab report must consist of the following parts and should be **WRITTEN IN YOUR OWN WORDS**:

1) **Title Page**
The title page should include your name, section, experiment number and title, lab partner, and the date the lab was performed.

2) **Introduction**
The introduction section is a brief overview of the lab and should not be written in great detail. What is the problem you are trying to solve and why? What useful information should this experiment provide?

3) **Experiment**
Under the experiment heading you should state what you are trying to accomplish on a particular part of the lab and **HOW** you accomplished it. What methods/techniques did you use? Design work should go in this section. This should include schematics, truth tables, equations, flow charts, state diagrams, **commented** source code, listings, pictures of functioning devices, or anything else you used in designing or setting up your experiment.

4) **Results**
The result section should contain the results (data) that you obtained from implementing the experiment as well as an analysis of the results. The results could be a truth table of actual results obtained, or it could be a description of what worked, what didn't work, and why it worked / didn't work.

5) **Conclusion**
The conclusion should state what was learned from the lab experiment and what you thought about it.

The report requires considerable thought to present the information in a logical and concise manner. All reports should be computer generated, using a word processing program and any other applications needed for plotting, drawing, and analysis. The "experiment" and "results" section should be based on individual parts of the lab. For example, a lab report for an experiment with three parts would be outlined as follows:

Title Page
Introduction
Part I:
Experiment
Results
Part II:
Experiment
Results
Part III:
Experiment
Results
Conclusion

The lab reports MUST be completed and submitted on an individual basis.

Lab Portfolio:

The portfolio for this lab **MUST** contain all lab handouts and graded lab reports from the semester inside of a standard 3-ring binder. Refer to the following bullets to see the mandatory components of this binder.

- One page summary of what was learned in the course.
- Syllabus
- Laboratory Handouts
- Student Work – Quizzes, exams and laboratory reports.
- Class Notes
- Self evaluation of what you learned this semester and the grade you believe you should receive (with justification)

Disability Statement:

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise the instructors and make appropriate arrangements with Disability Services (304-293-6700).

Social Justice Statement:

West Virginia University is committed to social justice. Instructors of this class concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.