

**West Virginia University – College of Engineering and Mineral Resources**

*Lane Department of Computer Science and Electrical Engineering*

**CPE 311 Microprocessor Systems Laboratory**

**Fall 2019 Syllabus**

Instructor: Bertrand Wieliczko  
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Lab Location: G24 ESB  
Lab Times: Monday 5:00-8:00 Section 003  
Tuesday 6:30-9:20 Section 005  
Thursday 9:30-12:20 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 (80386 family of microprocessor.) This will be via Single Board Computer (SBC) from Intel. 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 Intel System Studio for Microcontrollers 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 should 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 project 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 24 hours from due date.
- 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.
- 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. Reports should be submitted via TurnItIn on the class eCampus page.

A formal lab report must consist of the following parts:

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 each section 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

Feedback (optional)

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. Refer to the following bullets to see the mandatory components of this binder.

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

### **Late Assignments:**

Any assignment not submitted by the due date/time will receive an automatic 10% grade deduction per 24 hours. This is approximately 0.42% deduction per hour late. Please contact the instructor **BEFORE** the due date if you need to discuss an exception to an assignments due date. Note that absolutely no late assignments will be accepted for the Final Project.

### **Academic Integrity and Dishonesty:**

Writing that is not in your own words or submitting someone else's work as their own will result in a grade of 0 for the assignment. This includes but not limited to lab report, lab demonstration code, final project, etc. And specifically for the final project report, if the submission was plagiarized then the whole final project grade (20% of your overall grade) will result in a 0. Take note that eCampus automatically screens all submissions for plagiarism.

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course.

For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the West Virginia University Academic Catalog at

<http://catalog.wvu.edu/undergraduate/coursecredittermsclassification/#academicintegritytext>.

Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.

### **Incomplete Grades:**

Students who want to be considered for an Incomplete must apply to their instructor prior to the end of the term. If the instructor agrees, the instructor and the student must negotiate the conditions under which the grade of I will be changed to a letter grade and sign a contract. The date to submit the incomplete work should not be set beyond the last day of class of the following semester. If the student does not complete the terms of contract then the instructor should submit a grade of F. All incomplete contracts must be filed with the department and Dean's Office. See the policy at <http://catalog.wvu.edu/undergraduate/enrollmentandregistration/#gradestext>

### **Adverse Weather Commitment:**

In the event of inclement or threatening weather, everyone should use his or her best judgment regarding travel to and from campus. Safety should be the main concern. If you cannot get to class because of adverse weather conditions, you should contact me as soon as possible. Similarly, if I am unable to reach our class location, I will notify you of any cancellation or change as soon as possible using MIX/Gmail/eCampus to prevent you from embarking on any unnecessary travel. If you cannot get to class because of weather conditions, I will make allowances relative to required attendance policies, as well as any scheduled tests, quizzes, or other assessments.

### **Inclusivity Statement:**

The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the [Office of Accessibility Services](#)(304-293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu/>.