

**ELC 343 (0.5 CU)**  
**MICROCOMPUTER SYSTEMS**

**Course Information**  
**Fall 2015**

**Professor: Larry Pearlstein**

**Section L2: Fr 2:00PM–4:40PM/AR128**

**Course Description:** An introductory course in microcontrollers, microprocessors, embedded control architecture, and assembly language programming. Interfacing of external devices with microcontrollers is emphasized.

**Instructor Information:** Office Location: AR 130B  
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**Office Hours:** Tuesdays 2:00 PM – 3:20 PM  
Thursdays 2:00 PM – 3:20 PM  
By appointment (send me email)  
And whenever my office door is open

**Textbook:** Same as ELC411:  
[ZHU] Embedded Systems with ARM® Cortex-M3 Microcontrollers in Assembly Language and C, by Dr. Yifeng Zhu, E-Man Press, 2015  
ISBN 978-0-9826926-2-2

Class/lab manual handouts, and software tools and equipment user and reference manuals.

**Supplements:** PSoC® 5LP Architecture TRM (Technical Reference Manual), Cypress Semiconductor Corporation, 2013.

**Equipment:** CY8CKIT-050 PSoC® 5LP Development Kit, Cypress Semiconductor Corporation.

**Prerequisite:** Digital Circuits and Microprocessors (ENG 312)

**Grading Policy:** Three Labs @ 10% each = 30%  
Two Labs @ 20% each = 40%  
Term Project @ 30%  
Grand Total 100%  
Labs and the project are handed out at least two weeks before they are due. Due dates are to be announced in class.

**Tips for Success:** You do not have to wait until the scheduled lab time to do your labs.  
Do not procrastinate.  
Be neat and organized in your lab reports.  
Do not be shy about asking questions, either during class or outside of the class.

**College Level Policies:** Attendance Policy: <http://www.tcnj.edu/~recreg/policies/attendance.html>  
Academic Integrity Policy: <http://www.tcnj.edu/~academic/policy/integrity.html>  
Americans with Disabilities Act (ADA) Policy: <http://www.tcnj.edu/~affirm/ada.html>

## **Educational Objectives**

*(What TCNJ ECE engineers should be able to accomplish during the first few years after graduation)*

- To contribute to the economic development of New Jersey and the nation through the ethical practice of engineering;
- To become successful in their chosen career path, whether it is in the practice of engineering, in advanced studies in engineering or science, or in other complementary disciplines;
- To assume leadership roles in industry or public service through engineering ability;
- To maintain career skills through life-long learning.

## **Electrical and Computer Engineering Student Outcomes**

*(What TCNJ Electrical and Computer Engineering students are expected to know and be able to do at graduation. What knowledge, abilities, tools and skills the program gives the graduates to enable them to accomplish the Educational Objectives)*

The Student Outcomes listed below are expected of all graduates of the Electrical or Computer Engineering Program.

### **ECE graduates will have:**

- an ability to apply knowledge of mathematics, science and engineering;**  
Binary math is used extensively in projects.
- an ability to design and conduct experiments, as well as to analyze and interpret data;**  
Students perform projects that involve experimental hardware setups.
- an ability to design a system, component, or process to meet desired needs;**  
Students do design in projects.
- an ability to function in multidisciplinary teams;**  
Students do projects in teams that can involve EE and CoE majors.
- an ability to identify, formulate and solve engineering problems;**  
Students do projects.
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;**  
Students do presentations and write reports.
- the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- a recognition of the need for and an ability to engage in life-long learning;
- a knowledge of contemporary issues;
- an ability to use the techniques, skills and modern engineering tools necessary for engineering practice;**  
Modern computer design tools are used heavily throughout the course.

## **Course Objectives:\***

- Objective 1: To introduce students to the design and development of microcontroller systems and how to interface these products with external devices [a,b,c,d,e,k].
- Objective 2: To develop students' ability to understand and interpret laboratory data and to incorporate these findings into quality designs, and to be able to communicate these designs and findings to other engineers and supervisors via written reports and oral presentations [a,b,c,d,e,g,k]

- Topics Covered:**
1. Introduction to Assembly Language Programming
  2. Debugging and Downloading Programs
  3. Software monitoring and control of interface pins and driving displays
  4. Conversion between digital and analog signals
  5. How to Produce a Proper Program that is Well Documented

- Evaluation:**
- A. A Number of Design Project with Technical Reports
  - B. Final Project with Proper Documentation and Oral Presentation

## **Performance Criteria:\*\***

### Objective 1

1. Students will demonstrate an understanding of how to program in assembly language and how to design microcontroller systems [A, B].
2. Students will demonstrate the ability to interface microcontrollers to other electronic devices and how to design these systems [A, B]
3. Students will demonstrate the ability to design microcontroller systems to meet specifications produced by other departments [A, B]

### Objective 2

1. Students will demonstrate the ability to evaluate, determine specifications and model devices to incorporate these devices in microcontroller designs [A, B].
2. Students will demonstrate the ability to produce quality technical reports and produce quality technical presentations [A, B].
3. Students will demonstrate the ability to write proper software and how to document their designs [A, B]

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\* Small letters in brackets refer to the Student Outcomes

\*\* Capital letters in brackets refer to the evaluation methods used to assess student performance