

EST 343  
MICROCONTROLLER  
APPLICATIONS  
LABORATORY

INDEPENDENT STUDY COURSE  
SYLLABUS

EST 343 On-Line/Instructor of Record:  
Martin A. Hebel  
mhebel@siu.edu (Please include "EST 343" in the subject line)  
618.453.8806

Ensure you visit this website for other important information  
including getting on-line course material:

**<http://www.siu.edu/~mhebel/est343-ocap>**

*Read, sign and return a copy of the agreement sheet, last page, to EST 340 instructor  
for submission to the base office.*

# Course Syllabus

**COURSE NUMBER AND TITLE:** EST 343-3 Microcontroller Applications Laboratory

**EST MISSION STATEMENT:**

Electronic Systems Technologies is a broad based educational program designed to develop the technical and managerial skills necessary for a career in the electronics industry.

**COURSE DESCRIPTION:**

Laboratory experiences selected to reinforce microcontroller characteristics and applications in business and industry. Students sample microcontroller programming on operational microcontrollers and through the use of simulation software. Included is the theory of operation, the control of input and output devices, microcontroller communication, and program development and entry. Prerequisite: 342 or concurrent enrollment in 342, may be independent study.

**COURSE OBJECTIVES:**

Upon successful completion of this course, the student will be able to:

1. Demonstrate an understanding of the functional operation of a microcontroller.
2. Demonstrate an understanding of number systems.
3. Demonstrate an understanding of microcontroller architecture.
4. Perform programming in assembler and higher-level languages.
5. Demonstrate an understanding of reading and manipulating input from external devices, including interrupts.
6. Demonstrate an understanding of controlling an external device with outputs.
7. Demonstrate the ability to develop, document, and present an application for the microcontroller.

**COURSE WEBSITE:**

**Visit this site as soon as possible for information on this course:  
<http://www.siu.edu/~mhebel/est343-ocap>**

**COURSE MATERIALS:**

**For this course you will need a text, a microcontroller board, and parts. *These materials need to be ordered as quickly as possible.* The cost is approximately \$79. Please see the course website for additional information.**

**COURSE MECHANICS:**

The majority of this course will be performed as independent study. The student will perform projects from the text and answer questions pertaining to the programming and devices using an on-line course delivery system called BlackBoard.

*You will need to register as a student on-line during the first week of class. Please visit the course website for additional information.*

**COURSE GRADING:**

The majority of the coursework will be from on-line content using BlackBoard. Additionally, each student will develop a microcontroller project of their own design to be presented to, and graded by, the EST-342 instructor.

Grade Percentages:

On-line Homework/Labs	60%
Timely Completion	10%
Project	30%

Grading Scale:

90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
< 60%	F

Grading Criteria for the Programming Project:

Written Proposal	5 pts
Operation	40 pts
Project Paper	
Technical discussion	20 pts
Schematic	10 pts
Flowchart	10 pts
Code	10 pts
Presentation	5 pts

Written Proposal

Each student will submit to their EST-342 instructor on the 1<sup>st</sup> weekend of class a proposal of their project. The proposal will provide a discussion of what the final project will perform, anticipated controller features to be used, and hardware requirements.

Operation

The student will demonstrate operation to their instructor and the class. A fully functioning project as outlined in the proposal will receive full 50 pts. Any portions not operational will result in the loss of points as determined by the instructor.

Project Paper

The paper will provide a technical discussion of the operation of the paper. It should highlight devices used and programming of them. The paper should also discuss problems and solutions in the development of the project. The paper will also include a flowchart and well-commented source code.

### Presentation

The student will perform a presentation of their project to the instructor and class.

### Optional

Difficulty Multiplier: The instructor may optionally assign a Difficulty Multiplier to the projects at the time of proposal submission. The DM will range from 0.1 to 1.2, and will be multiplied by the project points for a final point grade. This provides a mechanism by which students that choose projects that will extend their skills will receive additional points allowing scores above 100%. It will also discourage projects that are well below the level of anticipated skill level.

### **Late Work Policies**

All work for EST 343 must be completed by the end of the final EST 342 meeting date. This provides one week for the instructor to grade the work and submit the final grades to the University.

### **Incomplete Grades**

An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. Students are required to apply, in writing, to the faculty member for an INC within two weeks of the last day of the course. Students are also required to contact the instructor by phone, email or FAX to inform the instructor that they (the student) will miss the last class weekend and will be requesting an INC. This contact will not replace the written request. Students who fail to inform the instructor and fail to request the incomplete in writing will receive the grade warned for the course or a WF, whichever is more appropriate.

### **COURSE DELIVERY**

This course typically spans the three-course semester of EST 340, 341 and 342. The instructors for EST 340 and 341 will assist, but are not expected to be experts on EST 343. Material from the text will be performed independently, and the students will answer lab questions on-line via BlackBoard. A designated instructor will handle all questions concerning on-line course delivery and requirements. The student project will be approved and graded by the EST-342 instructor

#### **To ensure timely completion:**

- **Chapters 1-4 of the text are to be completed by the first weekend of EST 341.**
- **Chapters 5-10 and the “Programming Challenge” are to be completed by the first weekend of EST 342.**
- **During EST 342, the student will focus on a project of his or her own design.**

All labs will be available throughout the semester. *Students NOT completing work on time as specified will lose 1% per lab off their grade for both deadlines.* Questions to all labs must be answered on-line via BlackBoard. *The programming challenge will have the final grade reduced by 5% each day late past the 1<sup>st</sup> weekend of EST 342.*

**Student Agreement of Understanding  
(Student copy)**

- I have read the syllabus.

I understand I am to:

- Visit the course website for information on:
  - Creating an SIU ID and joining BlackBoard, the online portion of the course.  
**<http://www.siu.edu/~mhebel/est343-ocap/>**
  - Ordering the required parts kit and text.
  - Information on using BlackBoard.
- I understand Chapters 1-4 questions are to be completed on-line by the start of EST-341.
- I understand Chapters 5-10 questions and programming challenge are to be completed on-line by the start of EST-342.
- I understand EST-342 does not cover material in EST 343, and that in EST 342 the class will be studying a different processor and language.
- I understand the individual final project will be performed during EST 342.
- I understand the failure to meet deadlines will result in a loss of up to 10% from my grade.
- I will contact the EST-343 instructor specified for any clarification and help needed during EST-340 and EST-341.  
**mhebel@siu.edu**

Student's Name: \_\_\_\_\_

Student's Phone: \_\_\_\_\_

Student's Email: \_\_\_\_\_

Signature & Date: \_\_\_\_\_

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(Office copy)**

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I understand I am to:

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  - Creating an SIU ID and joining BlackBoard, the online portion of the course.  
**<http://www.siu.edu/~mhebel/est343-ocap/>**
  - Ordering the required parts kit and text.
  - Information on using BlackBoard.
- I understand Chapters 1-4 questions are to be completed on-line by the start of EST-341.
- I understand Chapters 5-10 questions and programming challenge are to be completed on-line by the start of EST-342.
- I understand EST-342 does not cover material in EST 343, and that in EST 342 the class will be studying a different processor and language.
- I understand the individual final project will be performed during EST 342.
- I understand the failure to meet deadlines will result in a loss of up to 10% from my grade.
- I will contact the EST-343 instructor specified for any clarification and help needed during EST-340 and EST-341.  
**mhebel@siu.edu**

Student's Name: \_\_\_\_\_

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Student's Email: \_\_\_\_\_

Signature & Date: \_\_\_\_\_

***Please submit return this copy as soon as possible to the base coordinator.***