

EET242 Microcomputer Systems, Syllabus (F09)

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Course Description: This course will present microcomputer programming analysis and troubleshooting for real-time applications. The major emphasis will be the verification of student-assembled programs that use both serial and parallel input-output devices on a microcomputer system. Topics include: numbering systems, microprocessor unit, memory, input/output, instruction sets, addressing modes, assembler techniques, systems configuration, hardware, subroutines and example programs. This course concludes with a final project, written report and oral presentation. Prerequisite, EET141 or equivalent.

I. Class Meetings:

3 hours per week for Lecture / HW

3 hours per week for Lab

II. Course Materials:

A. Text: HCS12 Microcontroller and Embedded Systems Using Assembly and C with CodeWarrior by MuhammadAli Mazidi and Danny Causey, Pearson/Prentice Hall, 2009 (purchase)

B. Course Objectives, Lectures and Laboratories: Provided

C. DRAGON12-Plus Development Board and User's CD (provided)

III. Evaluation:

A. Two (2) excused absences are permitted per term. *Phone the instructor to be excused.* If a student's absences are excessive, the instructor may drop that student from the course.

B. Suggested Study Method and Calculation of Final Grade Point Average:

1 Review Questions and Problems

a. The *Review Questions* are include at the end of each reading sections. Answer all the questions if the particular section has been assigned. Answers to these questions are included at the end of the chapter.

b. The Problems are at the end of each chapter. Answer those problems that only relate to topics covered during lecture. Answers to all problems are included in the Chapter Handout / Assignment sheet.

2. Tests

70%

a. Tests for each chapter are typically given in class. The questions/problems are selected from the Review Questions and end-of-chapter Problems. (Note: An end-of-chapter Problem is included in the test only if it topic has been covered in lecture.). To be excused from a test you **must** contact the instructor *before* the test is to be taken. It is strongly recommended that you attend class for the lecture portion even if you do not intend to take the test. (Your instructor will indicate his/her preferred method of contact.)

b. *You will be given the opportunity to make up excused tests during an assigned make-period during the final examination week.* 5% will be deducted from an unexcused test. This make-up test will be similar to the excused test.

3. Laboratories and Final Oral Presentation 30%
 (Refer to the "Laboratory Report" below for details)

- a. Laboratory partners will be rotated for each laboratory
- b. The instructor will grade no more than one lab per week.
- c. If you are more than 15 minutes late, 5% will be deducted from the current experiment's grade
- d. The oral presentation counts as one laboratory
- e. *Pre laboratories* (when required) are to be completed *prior* to lab session, *initialed* by instructor and included in the Laboratory-Report Appendix

C. Final Grade Computation:

A = 90+	B+ = 85+	B = 80+	C+ = 75+	C = 70+	D = 65+	F < 65
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IV. Units and Topics

0. Introduction to Computing
1. The HCS12/9S12 Microcontroller: History and Features
2. The HCS12 Architecture and Assembly Language Programming
3. Branch, Call and Time Delay Loop
4. HCS12/9S12 I/O Port Programming
5. Arithmetic, Logic Instructions and Programs
6. Advanced Addressing Modes, Look-up Table, Macros, and Modules
7. HCS12 Timer Programming (optional)
8. HCS12 Serial Port Programming (optional)
9. Interrupt Programming (optional)
10. LCD and Keyboard Interfacing
11. ADC, DAC, and Sensor Interfacing

V. Laboratories (Refer to requirements below)

1. Introduction to the Draagon 12
2. Controlling LED's and Inherent Mode Addressing
3. Data Manipulation and Look-up Tables
4. Subroutines and Flow Control
5. The E-Clock and Programmed Time Delay
6. Sequential Time Delay
7. Keybad Scan Programming Methods
8. Generation of Musical Notes
9. Analog to Digital Conversion
10. Final Oral Presentation by each group (Refer to requirements below)

V. Schedule

Wk	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Date															
Chap															
Test															
Other															

Notes:

EET242 Laboratory Report Requirements

Each laboratory *group* is responsible for a laboratory report. A lab group is to consist of two students unless the class has an odd number of students. Lab groups may be rotated from week to week at the instructor's discretion. Each laboratory report shall have the sections outlined below. Please feel free to suggest modifications to this outline.

1. Title Page and Table of Contents

- In the upper portion of the page include the course number and title, laboratory name, lab members and date
- In the lower portion of the page give the heading "Table of Contents". It should include a list of the topics and figures followed by a page number. Ex: Figure 1 TESTAB.ASM Program.....2

2. Introduction / Background

- Include the purpose and / or objectives of the laboratory
- Introduce and educate the reader to the experiment by describing the purpose (and outcomes) of the experiment. (Note: Much of this information is included in the laboratory handout.) Where applicable, also include a brief discussion of supporting theory, programs, circuits, terms and measurements. (Some of these may be expanded in the next section.)

3. Software, Hardware and Results

- Explain how the hardware and software work together. Recall: The function of a μC is to communicate with and/or control external devices through its I / O lines and the program.
- Include the *.lst file
- Refer to "line numbers" on the *.lst file of your to supplement you explanation
- Use figure and table numbers and refer to them in your report
- Refer to MPU register results as you trace through through or troubleshoot the program
- Include simple block diagrams, program listings and schematics. (Note: Much of this information is included in the Lecture or Laboratory handout. Ask the instructor for electronic copies of these handouts from which you may "cut and paste")
- Include and discuss specific measurements such as voltages levels, binary codes and timing diagrams
- Diagrams and schematics may be drawn neatly by hand
- Show the reader that you understand the objectives of the experiment.
- Summarize how your findings answer the objectives of the experiment

4. Conclusion

- Compare measured and calculated results
- Include selected specific results that you feel are important.
- Include a brief discussion of problems, errors, unusual results
- Make suggestions for revisions to the laboratory

5. **Appendix:** Includes the Pre Lab, Lab and rough notes and rough data.

"Mechanics": Review your conclusion with your partner • Double space report • Do not exceed two double-spaced, typed pages (not including figures, listings, tables, etc) • Use the major headings discussed above • Number the pages • Give figures titles •

Program Mission Statement

The mission of the Burlington County College Electronics Engineering Technology and Computer Servicing & Networking Technology programs is to produce graduates who are able to obtain employment as a technicians or transfer to a four-year college. In addition, our graduates will be technically competent, able to communicate effectively, work well with others and demonstrate professionalism.

Program Educational Objectives (Numbers included for reference purposes only)

The Electronics Engineering Technology and Computer Servicing & Networking Technology programs prepare graduates who, during the first few years after graduation, should be able to:

1. Find employment as a technician or transfer to a four-year college,
2. Apply a broad knowledge of electronics and computer engineering technology to support manufacturing, design, testing, troubleshooting, sales, and field service of electronic and computer systems,
3. Apply knowledge of analog and digital electronics and use mathematics, scientific principles, and critical thinking to creatively solve technical problems,
4. Utilize computers and software in a technical environment,
5. Communicate effectively both verbally and in writing,
6. Work effectively as an individual and as a member of a team,
7. Show a recognition of the need for professional, ethical and social responsibilities
8. Continue professional training through conferences, seminars, courses and the pursuit of advanced degrees.

Program Outcomes (Letters refer to ABET "Criterion 2. Program Outcomes")

Graduates of the Electronics Engineering Technology and Computer Servicing & Networking Technology programs should demonstrate:

- a. an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines,
- b. an ability to apply current knowledge to new applications,
- c. an ability to conduct, analyze and interpret experimental results and apply results to make improvements where applicable,
- d. an ability to apply creativity in the design of systems, circuits or processes,
- e. an ability to work effectively on teams,
- f. an ability to identify the characteristics of, analyze and solve technical problems,
- g. an ability to communicate effectively through writing and oral presentation,
- h. a recognition of the need for, and an ability to engage in lifelong learning,
- i. an ability to understand professional, ethical, and social responsibilities,
- j. respect for diversity and a knowledge of contemporary professional, societal, and global issues, and
- k. a commitment to quality, timeliness and continuous improvement.