Texas A&M University–Corpus Christi  
College of Science and Technology  
Department of Computing Sciences  
Engineering Technology

ENTC 3418 Microprocessors and Microcontrollers  
Fall 2009

COURSE INFORMATION  
Meeting Time: TR 5:30 – 6:45 p.m. (lecture) and 7:00 – 8:15 p.m. (lab)  
Meeting Place: ST 111 (lecture and lab)

PROFESSOR INFORMATION  
Dr. Ruby Mehrubeoglu (Dr. M.)  
E-mail Address: ruby.mehrubeoglu@tamucc.edu  
Office Phone: (361) 825-3378  
Office Hours: T 2:00-4:00 p.m., W 1:00-2:00 p.m., F 9:00-11:00 a.m., and by appointment

COURSE DESCRIPTION  
Introduction to microprocessor architecture, assembly language programming, and interfacing. Topics include computer organization, addressing modes, instruction set, interrupts, timing, memory, and interfacing. Prerequisite: COSC 1435. Fall.

TEXT  

LAB MANUALS  
None to buy. Handouts will be used. Also, the following user manuals are available in the ET lab for students’ use:  
3. Getting Started with µVision 3 and the C51 Microcontroller Tools, 02.2001, Keil Software

INSTRUCTIONAL METHODS AND ACTIVITIES  
Methods and activities for instruction include the following: lectures, group discussions, homework assignments, lab experiments/exercises, software simulation, and a project.

EVALUATION AND GRADE ASSIGNMENT  
Evaluation of student performance is based on homework assignments, quizzes, two midterms, lab experiments/exercises, a project, and a final exam. Tests, except the final, are graded and returned within a week from the date they are taken. No makeup exams are given in this course.
You may examine the final exam within four weeks after the final grades are mailed to you. The final grade is assigned as follows.

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
<th>If</th>
<th>Grade</th>
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</thead>
<tbody>
<tr>
<td>Homework/Quizzes</td>
<td>10</td>
<td>90 ≤ total</td>
<td>A</td>
</tr>
<tr>
<td>Prelabs/Lab exercises/reports</td>
<td>20</td>
<td>80 ≤ total &lt; 90</td>
<td>B</td>
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<tr>
<td>Midterm Examination 1</td>
<td>15</td>
<td>70 ≤ total &lt; 80</td>
<td>C</td>
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<tr>
<td>Midterm Examination 2</td>
<td>15</td>
<td>60 ≤ total &lt; 70</td>
<td>D</td>
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<tr>
<td>Final Project Proposal</td>
<td>5</td>
<td>total &lt; 60</td>
<td>F</td>
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<tr>
<td>Final Project Presentation/Report</td>
<td>10</td>
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<tr>
<td>Project Notebook + Project Demo</td>
<td>5</td>
<td></td>
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<tr>
<td>Final Examination</td>
<td>20</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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**STUDENT LEARNING OUTCOMES**

At successful completion of this course, students will have demonstrated their ability to:

- Compare the characteristics of microcontrollers and microprocessors
- Convert between decimal, binary, octal and hexadecimal numbers
- Perform addition and subtraction in different bases (10, 2, 8, and 16)
- Understand binary codes, ex. ASCII, gray code, BCD, etc.
- Contrast machine, assembly, and high level programming languages
- Use software development tools (Keil software) to program microcontrollers
- Write assembly language programs that use the microcontroller addressing modes and instruction set
- Develop assembly language programs for I/O applications using the microcontroller ports, including building a circuit, downloading program, and testing operation
- Write and test assembly language programs (using a hardware circuit) that use the 8051 timers
- Write and test assembly language programs that use the external 8051 interrupts.
- Design, develop and analyze microcontroller interface circuits
- Demonstrate effective communication skills

**ATTENDANCE POLICY**

You are advised to attend all lectures and laboratory sessions. If you miss a class period, you are responsible for material covered/announced during your absence.

**ACADEMIC HONESTY**

Your attention is called to the University policy in the Student Handbook.

**ASSIGNMENTS**

Late assignments will be accepted with penalty. 20 points will be deducted, out of a total of 100, for each late day. Assignments may be turned in before the due date.

**LAB EXPERIMENTS**

The goal of the laboratory sessions is to analyze and verify the theoretical ideas learned in the classroom. Most experiments require written reports. The report is due one week after the
experiment is performed. Late reports will be accepted with penalty. 20 points will be deducted, out of a total of 100 points, for each late day. Reports may be turned in before the due date. Students should be prepared to spend more hours than scheduled to finish the experiments, if needed.

FINAL PROJECT
Students, in groups of two, must complete a final project. Project ideas and guidelines will be handed out in class. The student may come up with his/her own project, pending prior approval of the instructor.

BONUS
Bonus points will be given to those projects that have the quality of a student paper, and is submitted to a local student research conference. The instructor will provide details for the conference.

EMAIL ADDRESS
You must supply the instructor with a current email address and check your email account often. You supply your email address by sending an email message by the end of the first week to ruby.mehrubeoglu@tamucc.edu. In the subject area, type ENTC 3418 and write your.

SUPPLEMENTARY READING LIST
<table>
<thead>
<tr>
<th>WK</th>
<th>DATES</th>
<th>Readings</th>
<th>Topics</th>
<th>Labs/Exams</th>
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<tbody>
<tr>
<td>1</td>
<td>08/27</td>
<td>Ch. 1 Handouts</td>
<td>Course requirements, Introduction to Microprocessors and microcontrollers</td>
<td>Lab Safety</td>
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<tr>
<td>2</td>
<td>09/01, 09/03</td>
<td>Ch. 2, App. E, F, H Handouts</td>
<td>Hardware Summary; Numbering systems: binary arithmetic, codes, conversions</td>
<td>Lab 1 Tutorial</td>
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<tr>
<td>3</td>
<td>09/08, 09/10</td>
<td>Ch. 3 App. A, B, C, D</td>
<td>Instruction Set Summary: Addressing Modes Logic and Boolean Instructions; Jump Instructions</td>
<td>Lab 2 (Prelab 2 &amp; Lab 1 reports due)</td>
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<td>4</td>
<td>09/15, 09/17</td>
<td>Ch. 5</td>
<td>8051 Microcontroller Architecture Serial Port Operation and Data Communication</td>
<td>Lab 3 (Prelab 3 &amp; Lab 2 reports due)</td>
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<td>5</td>
<td>09/22, 09/24</td>
<td>Ch. 7</td>
<td>Assembly Language Programming: Arithmetic/Logic Operations; Moving Data Operations</td>
<td>Lab 4, Midterm 1 (Lab 3 Report Due)</td>
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<td>6</td>
<td>09/29, 10/01</td>
<td>Ch. 9</td>
<td>Program Structure and Design</td>
<td>Lab 5 (Prelab 5 &amp; Lab 4 reports due)</td>
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<td>10/06, 10/08</td>
<td>Ch. 4</td>
<td>Timers</td>
<td>Lab 6 (Prelab 6 &amp; Lab 5 report due)</td>
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<td>10/13, 10/15</td>
<td>Ch. 6</td>
<td>Interrupts</td>
<td>Lab 7 (Prelab 7 &amp; Lab 6 report due)</td>
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<td>10/20, 10/22</td>
<td>Ch. 10, 11</td>
<td>Microcontroller Design and Interface Handout project guidelines</td>
<td>Lab 8, Midterm 2 (Lab 7 Report Due)</td>
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<td>10</td>
<td>10/27, 10/29</td>
<td>Ch 11, 12</td>
<td>Apic</td>
<td>Lab 9 (Prelab 9 &amp; Lab 8 report due)</td>
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<td>11</td>
<td>11/03, 11/05</td>
<td>Ch. 8, 12</td>
<td>8051 Programming in C Project proposal Reports/Presentations</td>
<td>Lab 10 (Prelab 10 &amp; Lab 9 report due)</td>
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<td>11/10, 11/12</td>
<td>Ch. 13, 14 Handouts</td>
<td>Advanced Topics in Microcontrollersprocessors Project (conference paper due (optional))</td>
<td>(Lab 10 report due) Project</td>
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<td>13</td>
<td>11/17, 11/19</td>
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<td>Project / Guest Speaker</td>
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<td>14</td>
<td>11/24, 11/26</td>
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<tr>
<td>15</td>
<td>12/01, 12/03</td>
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<td>Project + BONUS paper, Final Project Presentations</td>
<td>Project</td>
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<td>16</td>
<td>12/08</td>
<td></td>
<td>Exam Review, Project Reports</td>
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Final examination: Thursday, 10 Dec. 2009, 4:30-7:00 p.m.

* Changes, if any, will be announced in class
SAFETY
The safety of students, faculty, staff and visitors to the ET laboratories is of paramount importance to the ET programs. You must follow safety procedures and use personal protective equipment as required in each laboratory. Any student that attempts to use equipment without authorization or that violates any safety policy or regulation will be immediately removed from the laboratory.

FOOD AND DRINKS
Eating and/or drinking is not permitted in the LAB.

NOTICE TO STUDENTS WITH DISABILITIES: Texas A&M University-Corpus Christi complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. If you suspect that you may have a disability (physical impairment, learning disability, psychiatric disability, etc.), please contact the Services for Students with Disabilities Office, located in Driftwood 101, at 825-5816. If you need disability accommodations in this class, please see me as soon as possible.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services Office for assistance at (361) 825-5816.

ADVISING
The College of Science and Technology requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. The College's Academic Advising Center is located in Faculty Center 178, and can be reached at 825-6094.

GRADE APPEALS
As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.