EEEN 3418 Microprocessors and Microcontrollers  
Electrical Engineering, School of Engineering and Computing Sciences  
Fall 2016

A. COURSE INFORMATION
   Course number/section: EEEN 3418.001/3418.201  
   Class meeting time: Lec: MWF 11:00 – 11:50 p.m.  
                       Lab: MW: 2:00-3:15 p.m.  
   Class location: Lec: EN 214; Lab: EN 220  
   Course Website: bb9.tamu.edu

B. INSTRUCTOR INFORMATION
   Instructor: Dr. Ruby Mehrubeoglu  
   Office location: EN 222B  
   Office hours: MW 9:30-11:00 a.m., F 10:00-12:00, and by appointment  
   Telephone: 361-825-3378  
   E-mail: Ruby.Mehrubeoglu@tamucc.edu  
   Appointments: E-mail or call to make an appointment

C. COURSE DESCRIPTION
   Catalog Course Description
   Introduction to microprocessor/microcontroller architecture, assembly language programming, 
   and interfacing. Topics include computer organization, addressing modes, instruction set, 
   interrupts, timing, memory, and interfacing.

   Extended Course Description
   This course covers microprocessor and microcontroller concepts with hands on experiences using 
   a microcontroller board. The student will program the microcontroller board using the host 
   language tools and understand machine code. At the end of the course the student will be able to 
   implement projects that receive input signals through a sensor, process data through computations 
   and logic decisions to output signals that will enable an actuator.

D. PREREQUISITES AND COREQUISITES
   Prerequisites
   Prerequisite: COSC 1330, ENGR 2306, ENGR 2106

   Corequisites
   none
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Lab Manual
None to buy. Handouts will be used. Also, the following user manuals are available in the lab for students’ use:
1. Getting Started with the Microcontroller Student Learning Kit (PBMCUSLK)
   Prototyping Board
   and the MC9S12C32 MCU Application Module.

Optional Reading or Other References

Supplies
Will be provided
F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

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

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Methods and activities for instruction include the following: lectures, homework assignments, lab experiments/exercises, exams, quizzes, a lab notebook, and a team project with a proposal and final report.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Evaluation of student performance is based on homework assignments, quizzes, a midterm, lab experiments/exercises, a team project, and a final exam. No makeup exams will be given in this course unless previously arranged with the instructor. The students are expected to attend class, and turn in assignments on or before the due date. A real-time lab notebook must be kept for the team project.
The final grade is assigned as follows.

<table>
<thead>
<tr>
<th>Points</th>
<th>If</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Homework/Quizzes 15</td>
<td>90 ≤ total &lt; 90</td>
<td>A</td>
</tr>
<tr>
<td>Lab exercises/reports 20</td>
<td>80 ≤ total &lt; 90</td>
<td>B</td>
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<tr>
<td>Midterm Examination 20</td>
<td>70 ≤ total &lt; 80</td>
<td>C</td>
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<tr>
<td>Final Project Proposal Presentation/Report 5</td>
<td>60 ≤ total &lt; 70</td>
<td>D</td>
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<tr>
<td>Final Project Presentation/Report 10</td>
<td>total &lt; 60</td>
<td>F</td>
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<tr>
<td>Project Notebook + Project Demo 5</td>
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<tr>
<td>Final Examination 25</td>
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<td><strong>Total</strong> 100</td>
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## I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>WEEK: DATE</th>
<th>TOPIC (LEC)</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS*</th>
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<tbody>
<tr>
<td>1: 08/24-08/26</td>
<td>Course requirements, Introduction to Computing</td>
<td>Ch. 0</td>
<td>Lab Safety</td>
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<tr>
<td>2: 08/29-09/02</td>
<td>Microcontroller and Microprocessor features</td>
<td>Ch. 1</td>
<td>Lab 1 Tutorial</td>
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<tr>
<td>4: 09/12-09/16</td>
<td>Branch, Call and Time Delay Loop</td>
<td>Ch. 3 App. C, D</td>
<td>Lab 3</td>
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<td>5: 09/19-09/23</td>
<td>I/O Programming</td>
<td>Ch. 4 App. E, F</td>
<td>Lab 4</td>
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<td>6: 09/26-09/30</td>
<td>Arithmetic, Logic Instructions, and Programs</td>
<td>Ch. 5 App. G, H</td>
<td>Lab 5</td>
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<tr>
<td>7: 10/03-10/07</td>
<td>Addressing Modes, LUT, Macros and Modules</td>
<td>Ch. 6</td>
<td>Lab 6 MIDTERM</td>
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<td>8: 10/10-10/14</td>
<td>Programming HCS12 in C Handout project guidelines</td>
<td>Ch. 7</td>
<td>Lab 7</td>
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<tr>
<td>9: 10/17-10/21</td>
<td>Timer Programming</td>
<td>Ch. 9</td>
<td>Lab 8</td>
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<tr>
<td>10: 10/24-10/28</td>
<td>Serial Port Programming</td>
<td>Ch. 10</td>
<td>Project proposal Reports/ Presentations</td>
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<td>11: 10/31-11/04</td>
<td>Interrupt Programming Project</td>
<td>Ch. 11</td>
<td>Project</td>
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<tr>
<td>12: 11/07-11/11</td>
<td>Interfacing: LCD, Keyboard, ADC, DAC and Sensors</td>
<td>Ch. 12, 13</td>
<td>Project</td>
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<td>13: 11/14-11/18</td>
<td>Accessing Flash and EEPROM Project</td>
<td>Ch. 13, 14</td>
<td>Project</td>
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<td>14: 11/21-11/23</td>
<td>Thanksgiving Holiday (24-25 November 2015) Relay and Stepper Motor Interfacing:</td>
<td>Ch. 15</td>
<td>Final Project Presentations (W) + Project Reports (F)</td>
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<td>15: 11/28-12/02</td>
<td>DC Motor Control</td>
<td>Ch. 17</td>
<td>Lab 7 (Lab 6 report due)</td>
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<td>16: 12/05</td>
<td>Exam Review, CD and Project Notebook due</td>
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Final Exam Date: Friday, 9 December 2016; 11:00 a.m. – 1:30 p.m.

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.
J. COURSE POLICIES

E-mail 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 EEEN 3418 and write your full name.

Attendance/Tardiness
You are advised to attend all lectures and laboratories. If you miss a class period, you are responsible for whatever is covered or announced during your absence. There will be no make-ups for oral presentations or quizzes. The students are expected to display responsible conduct in the classroom and laboratory, including but not limited to adhering to the rules and regulations, and respecting the instructor and fellow classmates.

Late Work
All assignments, both individual and team, must be uploaded by each student to Black Board online system as well as hard copies handed to the course professor in class by the due dates. Late assignments will only be accepted with penalty and with prior notification. There will be a 20 point deduction per late day from the total score of maximum 100 up to 5 days, after which a late assignment will not be accepted. Late assignments will not be accepted after the graded assignments are returned to class.

Extra Credit
Extra credit may be assigned at the discretion of the instructor.

Food in Class
Eating or drinking is strictly prohibited in the labs, and not permitted in the lecture rooms. Students with food or drink in visible sight will be asked to discard them, or leave the room. All signage regarding health and safety must be followed in the lecture rooms and laboratories.

Missed Exam
No makeup examinations will be given except in the case of a documented extreme emergency, or University-accepted excuse. Makeup exams will be different from the regular exams and more challenging.

Participation
Students are expected to participate in the in-class and online exercises, discussions, and team work.

Use of Electronic Devices
The use of cell phones, electronic devices, or computers for purposes other than those of the course objectives of the day is not permitted. Restricted activities include but are not limited to text messaging, twitting, talking on the phone, instgramming, browsing on the internet, and disrupting the classroom activities. Anyone displaying unsuitable classroom behavior will
be asked to leave the classroom or the laboratory. Recording of part or all of the lecture or lab instruction and materials requires approval of the course instructor.

Safety
The safety of students, faculty, staff and visitors to the engineering laboratories is of paramount importance to the Mechanical Engineering, Electrical Engineering and Engineering Technology programs. You must follow all safety procedures and use personal protective equipment as required in each laboratory and workshop. Any student who attempts to use equipment without authorization or violates any safety policy or regulation will be immediately removed from the laboratory.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior.
  See Full University Policy at http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity

• Classroom/Professional Behavior
  Please follow the student handbook and the course policies outlined above.

• Deadline for Dropping a Course with a Grade of W (University)
  The grade of W will be assigned to any student officially dropping a course by Friday, November 11, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must submitted. After November 11, 2015, a student will not be allowed to drop a course.

• Grade Appeals (College of Science and Engineering)
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, 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 Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at
For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Corpus Christi Hall 116.

  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.

**L. OTHER INFORMATION**

- **Academic Advising**
  The College of Science & Engineering 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. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

  Students are expected to work in teams and contribute to teamwork equally. Peer assessment scores will be considered when computing individual grades in team assignments.

**GENERAL DISCLAIMER**

The instructor reserves the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. The instructor will announce such changes in a timely manner during regularly scheduled lecture periods.