EEEN 3418 Microprocessors and Microcontrollers
Electrical Engineering Program, Department of Engineering
Fall 2019

A. COURSE INFORMATION

Course number/section: EEEN 3418.001/3418.201
Class meeting time:
  Lec: TR 9:30-10:45 am
  Lab: MW 3:30-4:45 pm
Class location:
  Lec: EL-110; Lab: EL-110
Course Website: Blackboard

B. INSTRUCTOR INFORMATION

Instructor: Jose Baca
Office location: Engineering Building 222B
Office hours: T,W,TR 1-3 pm
Email: jose.baca@tamucc.edu
Appointments: Email 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 Textbook(s) 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 using 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) using 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>ACTIVITY</th>
<th>Points - % of FINAL GRADE</th>
<th>If</th>
<th>Tentative Grade</th>
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</thead>
<tbody>
<tr>
<td>Homework/Quizzes</td>
<td>15</td>
<td>90 ≤ total</td>
<td>A</td>
</tr>
<tr>
<td>Lab exercises/reports</td>
<td>20</td>
<td>80 ≤ total &lt; 90</td>
<td>B</td>
</tr>
<tr>
<td>Midterm Examination</td>
<td>20</td>
<td>70 ≤ total &lt; 80</td>
<td>C</td>
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<tr>
<td>Final Project (Team) Presentation/Documentation/Video</td>
<td>15</td>
<td>60 ≤ total &lt; 70</td>
<td>D</td>
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<tr>
<td>Documents followed by another Team</td>
<td>5</td>
<td>total &lt; 60</td>
<td>F</td>
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<tr>
<td>Final Examination</td>
<td>25</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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### I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY WEEK)</th>
<th>TOPICS (Lecture)</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course requirements, Introduction to Computing, Microcontroller and Microprocessor features</td>
<td>Ch. 0, 1</td>
<td>Lab Safety</td>
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<td></td>
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<td>Lab 1 Tutorial</td>
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<td>2</td>
<td>Microcontroller Architecture and Assembly Language</td>
<td>Ch. 2</td>
<td>Lab 2</td>
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<td></td>
<td></td>
<td>App. A, B</td>
<td></td>
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<tr>
<td>3</td>
<td>Branch, Call and Time Delay Loop</td>
<td>Ch. 3</td>
<td>Lab 3</td>
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<td></td>
<td></td>
<td>App. C, D</td>
<td></td>
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<tr>
<td>4</td>
<td>I/O Programming</td>
<td>Ch. 4</td>
<td>Lab 4</td>
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<td>App. E, F</td>
<td></td>
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<tr>
<td>5</td>
<td>Arithmetic, Logic Instructions, and Programs</td>
<td>Ch. 5</td>
<td>Lab 5</td>
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<td>App. G, H</td>
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<tr>
<td>6</td>
<td>Addressing Modes, LUT, Macros and Modules</td>
<td>Ch. 6</td>
<td>Lab 6 MIDTERM</td>
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<td>7</td>
<td>Programming HCS12 in C Handout project guidelines</td>
<td>Ch. 7</td>
<td>Lab 7</td>
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<tr>
<td>8</td>
<td>Timer Programming</td>
<td>Ch. 9</td>
<td>Lab 8</td>
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<td>9</td>
<td>Serial Port Programming</td>
<td>Ch. 10</td>
<td>Project</td>
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<td>10</td>
<td>Interrupt Programming Project</td>
<td>Ch. 11</td>
<td>Project</td>
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<tr>
<td>11</td>
<td>Interfacing: LCD, Keyboard, ADC, DAC and Sensors</td>
<td>Ch. 12, 13</td>
<td>Project</td>
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<tr>
<td>12</td>
<td>Accessing Flash and EEPROM Project</td>
<td>Ch. 13, 14</td>
<td>Project</td>
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<tr>
<td>13</td>
<td>Relay and Stepper Motor Interfacing;</td>
<td>Ch. 15</td>
<td>Final Project (Team)</td>
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<td></td>
<td>Presentation/Documentation/Video</td>
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<tr>
<td>14</td>
<td>DC Motor Control</td>
<td>Ch. 17</td>
<td>Final Project (Team)</td>
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<td>Presentation/Documentation/Video</td>
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<tr>
<td>15</td>
<td>Documents followed by another team</td>
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<td>Final Exam: December 12th, 2019, 8:00-10:30 am</td>
<td>FINAL</td>
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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

**Email Address**

You must supply the instructor with a current student 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 jose.baca@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 and Make-up Exams**
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. There will be no make-up exams unless University-excused absence can be documented.

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

**Food in Class**
Eating and drinking are 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 Cell Phones and Other 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, twittering, talking on the phone, instagramming, 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)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. **Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course.** Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation **WILL NOT automatically result in your being dropped from the class.** Please consult the Academic
Calendar (http://www.tamucc.edu/academics/calendar/) for the last day 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 http://sci.tamucc.edu/students/GradeAppeal.html. 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 (361) 825-5816 or visit Disability Services 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. http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.
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.

GENERAL DISCLAIMER

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