EEEN 3418 Microprocessors and Microcontrollers
Department of Engineering
Fall 2020

A. COURSE INFORMATION

Course number/section: EEEN-3418_001 (lecture) & EEEN-3418_201 (lab)
Class meeting time: TR 9:30am-10:45am (lecture) & MW 3:30pm-4:45pm (lab)
Class location: IH-163 (lecture) & EL-110 (lab)
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

Instructor: Dr. Pablo Rangel
Office location: RFEB 308
Office hours: TRF 3:00pm-5:00pm (Face to Face OR Webex/Zoom)
Telephone: (361) 825-3712
e-mail: pablo.rangel@tamucc.edu
Appointments: send an e-mail request for appointment, with proposed time.

Note: You can send me an email directly through BB (https://ualr.edu/blackboard/welcome/how-to/blackboard-announcements/sending-email/)

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 course will provide a greater focus on introducing embedded systems to the student. 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
COSC 1320 - C Programming, ENGR 2306 - Digital Systems, and ENGR 2106 - Digital Systems Laboratory

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

Required Textbook(s)

Other notes will be supplied as needed.

Lab Manual

Optional Textbook(s) or Other References

Website: https://bb9.tamucc.edu. This will be used primarily for student interface with information and assignments. Check it daily!!!

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. Design, develop and analyze microcontroller interface circuits
3. Use software development tools to program microcontrollers.
5. Develop C and assembly language programs for I/O applications using the microcontroller. ports, including building a circuit, downloading program, and testing operation.
6. Write and test C and assembly language programs timers and interrupts.
7. Explain program organization and general software environment of a microprocessor system.
8. Understand the basic features of computer hardware.
9. Understand system integration and interfacing at a basic level.
10. Demonstrate competence in written technical communication.
G. INSTRUCTIONAL METHODS AND ACTIVITIES

Methods and activities for instruction include the following: lectures, homework assignments, lab experiments/exercises, exams, quizzes, 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, programming assignments, two exams, lab assignments, and a team final project. No makeup exams will be given in this course unless previously arranged with the instructor. The students are expected to attend or sign in to the Webex and turn in assignments on or before the due date. A deduction of points may be given. Leaving it on my inbox does not guarantee it will be accepted. If submitting it early, the assignment needs to be labeled clearly on front of it. A PowerPoint slides-based project storyboard must be kept for the team project. The final grade is assigned as follows:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL</th>
<th>Total Score</th>
<th>Tentative Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework/Programming</td>
<td>30</td>
<td>90 ≤ total</td>
<td>A</td>
</tr>
<tr>
<td>Lab Assignments</td>
<td>30</td>
<td>80 ≤ total &lt; 90</td>
<td>B</td>
</tr>
<tr>
<td>Exam I</td>
<td>10</td>
<td>70 ≤ total &lt; 80</td>
<td>C</td>
</tr>
<tr>
<td>Exam II</td>
<td>10</td>
<td>60 ≤ total &lt; 70</td>
<td>D</td>
</tr>
<tr>
<td>Final Project Proposal Presentation</td>
<td>5</td>
<td>total &lt; 60</td>
<td>F</td>
</tr>
<tr>
<td>Final Project Demo and Report</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Final Storyboard</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td></td>
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## COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE BY WEEK (Tentative)</th>
<th>LECTURE TOPICS</th>
<th>LAB TOPICS</th>
<th>EXAMS AND LAB ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 Aug 19-28</td>
<td>Module 01 Ch 0. Introduction to Computing, Microcontroller and Microprocessor features Ch 1. Introduction to Embedded Systems</td>
<td>Keil and MSP432 Tutorial 0. Introduction to Computing</td>
<td>Lab Safety Certificate Tutorial Lab 0</td>
</tr>
<tr>
<td>3-4 Aug 31-Sep 11</td>
<td>Module 02 Ch 2. Software Design</td>
<td>1. C for Embedded Systems</td>
<td>Lab 1</td>
</tr>
<tr>
<td>5-6 Sep 14-25</td>
<td>Module 03 Ch 3. Introduction to Interfacing</td>
<td>2. MS432 ARM I/O Programming 3. LCD and Keyboard Interfacing</td>
<td>Lab 2 Lab 3</td>
</tr>
<tr>
<td>8 Oct 5-9</td>
<td>Module 05 Ch 5. Finite State Machines</td>
<td>10. Relay, optoisolator, and Stepper Motor Interfacing 11. PWM and DC Motor Control</td>
<td>Lab 6 Lab 7</td>
</tr>
<tr>
<td>9-10 Oct 12-23</td>
<td>Module 06 Ch 6. Real-time Systems</td>
<td>6. Interrupt and Exception Programming</td>
<td>Lab 8 Exam I (Ch.1-5) Oct 22</td>
</tr>
<tr>
<td>12 Nov 2-6</td>
<td>Module 08 Ch 8. Data Acquisition Systems</td>
<td>4. UART Serial Port Programming Interfacing</td>
<td>Lab 10</td>
</tr>
<tr>
<td>Nov 25-30</td>
<td>Reading Day-Thanksgiving-Reading Day</td>
<td>Final Project Demo &amp; Storyboard &amp; Report Thursday December 3, 2020 8:00am - 10:30am</td>
<td></td>
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</tbody>
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Please consult the Academic Calendar for Holidays and class drop deadlines [https://www.tamucc.edu/academics/calendar/2020_spring.html](https://www.tamucc.edu/academics/calendar/2020_spring.html)
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

COVID-19
Face Coverings—TAMUCC-Face Coverings (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Extra masks will be made available if needed.

Attendance/Tardiness
You must attend all lectures. Grading for Attendance will not be counted if there is no a legitimate excuse/cause. Attendance will count as extra credit towards your final grade with a percentage based on the instructor’s criteria. You are responsible for any materials covered or handed out or announcements made in your absence, therefore make arrangements with classmates when this happens. Records of your attendance will be maintained. Tardiness without the prior consent of the instructor is not accepted and will be penalized. Being tardy consistently without consent can be basis to be removed from class or not be permitted to enter class. This is a disruption to other classmates, impolite and not of an ethical person.

Late Work and Make-up Exams
Late work, scheduled exam absences are not accepted unless there exists legitimate excuse (illness, death in the immediate family, etc.) and adequate documentation is furnished. If a make-up were to be needed it could be a degree higher in difficulty.

Extra Credit
Any will be labeled as such on assignments, exams, and quizzes, etc. Other extra credit to be announced in class as needed.

Cell Phone Use
Cell phone use is prohibited once class begins. They are to be silenced and put away where they are not seen. If a call is expected take it out of the class. Anyone that interrupts class due to cell phone will be asked to leave.

Laptop Use
May be permitted if used for current class work; other uses other than this class is not permitted.
Food in Class
No food or drinks permitted. An exception is bottled water with a cap or sealable lid. Most coffee mugs are not sealable.

Missed Exam
You will receive a zero for a missed exam, unless you have accommodations with Instructor or have a legitimate excuse. You are to communicate any issues immediately.

Participation
To be announced in class when extra points are given.

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.C0.03, 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 required 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.C0.03, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://academicaffairs.tamucc.edu/rules_procedures/assets/13.02.99.c0.03_student_grade_appeals.pdf. 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/

- **Civil Rights Complaints**
  Texas A&M University-Corpus Christi is committed to fostering a culture of caring and respect that is free from discrimination, relationship violence and sexual misconduct, and ensuring that all affected students have access to services. For information on reporting Civil Rights complaints, options and support resources (including pregnancy support accommodations) or university policies and procedures, please contact the University Title IX Coordinator, Sam Ramirez (Samuel.ramirez@tamucc.edu) or Deputy Title IX
Coordinator, Rosie Ruiz (Rosie.Ruiz@tamucc.edu) x5826, or visit website at Title IX/Sexual Assault/Pregnancy.

**Limits to Confidentiality.** Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees, including instructors, are not able to maintain confidentiality when it conflicts with their responsibility to report alleged or suspected civil rights discrimination that is observed by or made known to an employee in the course and scope of their employment. As the instructor, I must report allegations of civil rights discrimination, including sexual assault, relationship violence, stalking, or sexual harassment to the Title IX Coordinator if you share it with me.

These reports will trigger contact with you from the Civil Rights/Title IX Compliance Office who will inform you of your options and resources regarding the incident that you have shared. If you would like to talk about these incidents in a confidential setting, you are encouraged to make an appointment with counselors in the University Counseling Center.

- **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.