ECE 231, Introduction to Embedded Systems
Spring 2020

Tentative Syllabus (revised 27 Jan 2020)

Instructors: Baird Soules
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                                                                                 Thu 10 – 11 AM

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Teaching Assistants (TA):   Adithya Kommini
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Undergraduate Instructional Assistants (UIA): Aisha Ben-Neticha of Shrewsbury, Mass.
                                                      Sebastian Caicedo of Colombia and Springfield, Mass.
                                                      Rachel Chen of Foshan, China
                                                      Jenn Gosselin of Hubbardston, Mass.
                                                      Tong Shen of Boston and Newton, Mass. and Nanjing, China
                                                      Josh Teixeira of Hudson, Mass. and the Azores
                                                      Sai Thuta Kyaw of Yangon, Myanmar
                                                      Josh Wolfman of Amherst, Mass.

Credits: 4

Prerequisites: ECE 122, Intro. to Programming and ECE 124, Intro. to Digital and Computer Systems

Class Meetings: Monday and Wednesday, 2:30 – 3:45 PM, Engineering Lab II, Room 119

Laboratory Sessions: budget approximately three hours per week, unscheduled

Laboratory Support Sessions: TBA

Course Description: Embedded systems sense, actuate, compute, and communicate to accomplish tasks in domains such as telecommunications, consumer electronics, medical, automotive and industrial controls. In this course, students will learn the fundamentals of using microprocessor-based embedded systems to solve problems in these domains. By the end of the course, students will be able to choose appropriate hardware based on application requirements, execute and optimize programs on simple microcontrollers, and interface these controllers to other subsystems. These topics will provide a basis for upper level applied courses, including junior and senior design labs. In addition to lectures, the course includes a lab component.

Approach: This course will consist of a combination of in-class lecture/discussion and out-of-class lab activities. The C programming language will be used throughout the course. Particular attention will be placed on the fundamental interfaces between microcontrollers and peripheral devices, namely General Purpose Input/Output (GPIO), timer/counters, asynchronous serial data communication and synchronous serial data communication. In the first half of the course you'll be programming and interfacing with 8-bit Microchip AVR microcontrollers in the Atmel Studio 7 Integrated Development Environment (IDE). In the second half of the course you'll be programming and interfacing with the 32-bit 1 GHz ARM Cortex A8 BeagleBone Black Linux computer.

| Online resources: | **Moodle** will be used for document submission and grading. |
| | **Piazza** will be used for course materials and online discussions. |

Course Activities: **Lecture** every Monday and Wednesday, 2:30 – 3:45 PM

Homework due on Moodle every Monday at 2:30 PM (no late submissions will be accepted)

Quizzes

Lab 1 Demos: evenings of Wed, Feb 12 and Thu, Feb 13
    Lab reports due on Sunday after lab demo.

Lab 2 Demos: evenings of Thu, Mar 5 and Fri, Mar 6 (because of ECE 214 exam on Wed)
    Lab reports due on Sunday after lab demo.

Lab 3 Demos: TBA

Lab 4 Demos: TBA

Evening Exam 1: 7:00-9:00 PM, Wed, March 11, Morrill Science Center Bldg 1 N375

Evening Exam 2: 7:00-9:00 PM, Wed, April 22, Morrill Science Center Bldg 1 N375

Final Exam: TBA

Optional Assignments

Grading:	Lab 1:	10% (90% demo + 10% report)
	Lab 2:	10% (90% demo + 10% report)
	Lab 3:	10% (90% demo + 10% report)
	Lab 4:	10% (90% demo + 10% report)
	Homework:	10%
	Exam 1:	15%
	Exam 2:	15%

Final Exam:	20%
Quizzes:	0%
Optional Assignments	0%

Etiquette. Being respectful of your classmates and members of the instructional team is expected. Distracting other students will not be tolerated. Chatting, texting, using email, Facebook, Twitter, Instagram, Reddit, Discord, movie apps, TV apps, looking at your vacation pictures, etc. during lectures are all examples of distracting activity.

Integrity. There is no place for a dishonest engineer! Please read and be aware of the academic honesty policy: http://www.umass.edu/dean_students/academic_policy. While this isn't something that should arise, it is something we should be aware of and discuss as a class, as integrity is a core value of the engineering profession.

Health and Wellbeing. Success in this course and the College of Engineering depends heavily on your personal health and wellbeing. Recognize that stress is an expected part of the college experience, and it often can be compounded by unexpected setbacks or life changes outside the classroom. I strongly encourage you to reframe challenges as an unavoidable pathway to success. Reflect on your role in taking care of yourself throughout the term, before the demands of exams and projects reach their peak. Please feel free to reach out to me about any difficulty you may be having that may impact your performance in your courses or campus life as soon as it occurs and before it becomes too overwhelming. I encourage you to contact support services on campus that stand ready to assist you. Within the College, you may reach out to your academic advisor, the Office of Student Affairs (126 Marston) or the Office of Community Equity and Inclusion (128 Marcus). You can learn about the confidential mental health services available on campus by calling the Center for Counseling and Psychological Health (CCPH) at 413.545.2337 or visiting their website at umass.edu/counseling. There are many other resources on campus for students facing personal, financial or life challenges to find support, stay in school, and graduate. See a comprehensive list at umass.studentlife/single-stop. Help is always available. Please reach out for support finding the resources you need.

Disability Accommodation and Inclusive Learning Statement. Your success in this class is important to me. We all learn differently and bring different strengths and needs to the class. The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you have a qualifying disability and require accommodations while participating in this course, please work with Disability Services to have an accommodation letter sent to me in a timely manner. If you have a disability but are not yet affiliated with Disability Services, please register with Disability Services (161 Whitmore Administration building; phone 413-545-0892). Information on services and materials for registering are also available on their website www.umass.edu/disability. If you are eligible for exam accommodations, your exams will be administered by the exam proctoring center. Contact Disability Services immediately, and comply with their exam scheduling policies, including the requirement that you book your exams at least seven days in advance of the exam date. *It is incumbent upon you contact me during the first few weeks of the semester, or shortly following registration with Disability Services, to ensure that your accommodations are being sufficiently met, including extra time and note-taking access, as applicable.* Finally, beyond disability accommodations, if there are aspects of the course that prevent you from learning or make you feel excluded, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

Inclusivity: The diversity of the participants of this course is a valuable source of ideas, problem solving strategies, and engineering creativity. If you feel that your contribution is not being valued or respected for any reason, please speak with me privately. If you wish to communicate with someone else in the College, speak with Assistant Dean Dr. Paula Rees (rees@umass.edu, 413.545.6324, 128b Marcus Hall). You may also submit anonymously through the College of Engineering Climate Concerns and Suggestions on-line form (https://tinyurl.com/UMassEngineerClimate) and/or the Positive and Negative Classroom Experience online form (https://tinyurl.com/UMassEngineerClassroom). We are all members of an academic community with a shared responsibility to cultivate a climate where all students/individuals are valued and where both they and their ideas are treated with respect.

Pronouns and Names. Everyone has the right to be addressed by the name and pronouns that they use for themselves. Students can indicate their preferred/chosen first name and pronouns on SPIRE, which appear on class rosters. Please let me know what name and pronouns I should use for you if they are not on the roster. A student's chosen name and pronouns are to be respected at all times in the classroom. To learn more, read the Intro Handout on Pronouns:
https://www.umass.edu/stonewall/sites/default/files/pronouns_intro.pdf

Title IX. Any conduct that has the purpose or effect of unreasonably interfering with an individual's performance by creating an intimidating, hostile, or sexually offensive educational, academic, residential, or working environment is considered sexual harassment. Faculty have the responsibility to inform students of the resources and reporting options relevant to reporting an incident of sexual assault, sexual harassment, relationship violence or stalking for all genders. You may go to the Title IX webpage at http://www.umass.edu/titleix/ and the Sexual & Relationship Violence Resource Guide at (https://www.umass.edu/titleix/sites/default/files/documents/sexual_violence_resource_guide-fall2019.pdf) to find more information about resources and reporting options. Please reach out to me if you would like assistance connecting with any of these resources/options. You may also contact William Brady, the Interim Title IX Coordinator by email at wdbrady@umass.edu or by phone at (413) 545-6204 if they have any questions or want to make a report, file a complaint, find out about resources and/or academic support.