ECE 251 Course Syllabus: Fall 2022
Introduction to Microcontrollers and IoT

Instructor: Steve Undy
Office Location: Engineering B112
Email: steve.undy@colostate.edu
Office Hours: Tuesdays and Thursdays 10:00-11:00 AM

Lab TA: Sai Bhuvan Thota
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Office Hours: M Noon-1PM, F 11AM-Noon (C107)

Class Lectures: Tuesdays and Thursdays 8 – 9:15 AM  Clark A104
Lab – L02: Tuesdays 2 – 4:50 PM  Engr C107
Lab – L03: Fridays 8 – 10:50 AM  Engr C107
Lab – L04: Mondays 9 – 11:50 AM  Engr C107
Lab – L06: Tuesdays 9:30 AM – 12:20 PM  Engr C107

Required Text: Embedded Systems with ARM Cortex-M3 Microcontrollers in Assembly Language and C, Dr. Yifeng Zhu, Third Edition preferred; all editions are acceptable.

Course Description: Microprocessor organization, assembly language, C language, I/O techniques, real-time interfaces, applications, hardware and software.

Prerequisites: ECE102 (Digital Circuit Logic)

Grading:
The following is the grading breakdown for each major component:
   - Midterm Exam  15%
   - Final Exam  25%
   - Labs & Practicals  35% (20% Practical, 80% Labs)
   - Homework Assignments  12.5%
   - Quizzes & Participation  12.5%

Grading Scale:
While lower cutoffs may be used, the following grade cut-offs are guaranteed:

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Homework: Homework problems will usually be assigned every other week on Canvas. Late homework will not be accepted without prior instructor approval.

Quizzes: Quizzes will be periodically given in class throughout the semester during the lectures. They will be used to test knowledge gained during lectures.
Labs: There will be a series of 8-9 labs. They will each be either one or two weeks long. There will be one lab practical exam during the course that will be held during your respective lab period. This practical will focus on your programming skills. Successful completion (>60%) of all labs is required for a passing course grade. Lab reports are due on Canvas the week after they are completed (on the same day as your lab session). Late submissions can be turned in up to 14 days (unless the final deadline near the end of the semester supersedes this) with a penalty of 10% for each day late with a maximum penalty of 50%. After 14 days late, the submission will receive a 0. For example, the maximum score for two days late is 80% while the maximum score for 5-14 days late is 50% and for >14 days late is 0%.

Collaboration: You are expected to work on all homework problems and labs yourself (or within your team), but reasonable collaboration is allowed and encouraged. Copying software from another student is not allowed. No collaboration will be allowed on any quiz, exam or practical.

Attendance in class is expected. If you are unable to attend class, it is your responsibility to obtain class notes or other information. Make-up quizzes will not be allowed; however, your lowest quiz score will be dropped from your quiz average.

Academic Integrity:
This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (http://www.conflictresolution.colostate.edu/academic-integrity) and the Student Conduct Code (http://www.conflictresolution.colostate.edu/conduct-code). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services. All submitted work should be your own. Copying of language, structure, images, ideas, or thoughts of another, and representing them as one’s own without proper acknowledgement (from web sites, books, papers, other students, solutions from previous offerings of this course, etc.) and failure to cite sources properly is not acceptable. Sources must always be appropriately referenced, whether the source is printed, electronic, or spoken. My policy is that of zero tolerance. Minor first infraction in HWs will lead to a zero score as well as one letter level (e.g. A to B) reduction in the course grade. Major repeated infractions in HWs will result in “F” grade for the course as well as reporting to the Dean’s Office.
ECE 251 Course Outline

Digital Logic Fundamentals

Microprocessors: Major Components

C Programming Language

ARM Cortex Microcontroller: Register Model & Addressing Modes

ARM Cortex Assembly Language Programming

ARM Cortex Instruction Set:
  Data transfer and manipulation instructions
  Arithmetic Instructions
  Logical and Bit Operations
  Branch Instructions

MIDTERM Exam in class

Advanced Assembly Programming
  Software Delay
  Programming Techniques
  Assembly Process
  Loops
  Stack and Stack Pointer
  Subroutines and Parameter Passing

Parallel I/O

Exceptions: Resets and Interrupts

SysTick Real Time Clock

ARM Cortex Serial I/O

Fixed-Point and Floating-Point Numbers

Analog to Digital Converter

Adding Memory to Processor

FINAL EXAM  Thursday, December 15, 2022 10, 9:40-11:40 AM Clark A104
Important information for students:

Masks are no longer required inside university buildings. You must, however, meet university vaccine or exemption requirements.

All students are expected and required to report to the COVID Reporter (https://covid.colostate.edu/reporter/) when:

- You suspect you have symptoms of COVID, regardless of whether or not you are vaccinated and even if your symptoms are mild
- You have tested positive for COVID through a non-CSU testing site, such as home test or test at a pharmacy
- You believe you may have been exposed to COVID go to the COVID Reporter and follow the guidance under “I believe I have been in close contact with someone who has COVID-19.” This guidance will depend upon your individual circumstances

You will not be penalized in any way for reporting symptoms or concerns.

Do not ask me as your instructor to report for you. It is your responsibility to report through the COVID Reporter promptly.

As your instructor I may not ask you about vaccination status or if you have COVID but you may freely volunteer to send me information from a public health official - if you have been asked to isolate or quarantine.

When you complete the COVID Reporter, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps.

If you do not have internet access to fill out the online COVID-19 Reporter, please call (970) 491-4600.

For the latest information about the University’s COVID resources and information, including FAQs about the spring semester, please visit the CSU COVID-19 site https://covid.colostate.edu/.

CSU Has Resources to Help
Many of us are struggling. CSU is a community that cares. You are not alone. CSU Health Network Counseling Services has trained professionals who can help. Your student fees provide access to a wide range of support services. Call Counseling Services at (970) 491-6053, and they will work together with you to find out which services are right for you. Visit https://health.colostate.edu/about-counseling-services to learn more and https://health.colostate.edu/mental-health-resources/ for additional student mental health and well-being resources. If you are concerned about a friend or peer, use Tell Someone by calling (970) 491-1350 or visiting https://supportandsafety.colostate.edu/tell-someone/ to share your concerns with a professional who can discreetly connect the distressed individual with the proper resources. Rams Take Care of Rams. Reach out and ask for help if you or someone you know if having a difficult time.