

EENG 4010.011/5940.011
Embedded Controller Organization
Course Syllabus
SPRING 2021

University of North Texas
Electrical Engineering

Date Prepared: January 7th, 2021

Prepared by: Elias Kougianos

Instructor: Elias Kougianos

Office: <https://unt.zoom.us/j/2997753074>

Office Hours: (Tu & Th) 3:00 pm - 4:00 pm

Phone: 940-891-6708

Course web site: <http://canvas.unt.edu>

Time: (Tu & Th) 4:00 pm – 5:20 pm

Meeting Place: Zoom

Email: elias.kougianos@unt.edu

Course Number, Title, Credit Hours:

EENG 4010.011/5940.011 Embedded Controller Organization, 3 Credit Hours

Course Description:

Fundamentals of embedded system organization including CPU architectures, memory systems, basic input / output, and software development for embedded systems in assembly and C.

Prerequisites:

EENG 2710 (Digital Logic Design). C Programming Language. Engineering or engineering technology majors.

Textbook and/or other required material:

- Yifeng Zhu, *Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language and C*, 3rd Edition, ISBN 978-0-9826926-6-0. The textbook is required.
- Information about the textbook, including links to purchase it (Amazon, Walmart), can be found [here](#).
- Additional material, as required, will be provided on Canvas.

Course Topics:

- Data Representation in Embedded Systems
- Memory Types and Memory Organization
- ARM Instruction Set Architecture
- Arithmetic and Logic Instructions

- Load/Store Instructions
- Branches and Conditional Execution
- Structured Programming & Subroutines
- 64-bit Data Processing in 32-bit Architectures
- Mixing C and Assembly
- Interrupts
- Fixed-Point and Floating-Point Arithmetic
- Instruction Encoding and Decoding
- Direct Memory Access (DMA)
- Multitasking
- Digital Signal Processing using Microcontrollers

Grading:

- Exam 1: 30%
- Exam 2: 30%
- Final: 40%

Grading scale (based on total course points):

| | |
|--------------|---|
| 90% - 100% | A |
| 80% - 89.99% | B |
| 70% - 79.99% | C |
| 60% - 69.99% | D |
| 00% - 59.99% | F |

NOTES:

The exam schedule is as follows:

Test 1 is on Thursday Feb. 18 (Week 6)

Test 2 is on Thursday Apr. 1 (Week 12)

The final exam will take place on Thursday April 29, 1:30-3:30PM

All tests, including the final, will be online. All tests will be open book, open notes.

Test submission:

- **If you have access to a printer:** print out the test and write the solutions in the space provided. Insert additional pages if needed but please make sure they clearly indicate which problem they belong to. Assemble all sheets, number them sequentially, scan them into a **single** pdf file using a scanner or your cell phone and submit the file via Canvas before the deadline.
- **If you do not have access to a printer:** Write out the answers to the exam problems by hand, one problem per page. Make sure you clearly label which problem solution the sheet belongs to. Assemble all sheets, number them sequentially, scan them into a **single** pdf file using a scanner or your cell phone and submit the file via Canvas before the deadline.

Missed Exams:

You will be allowed to make up a missed exam only if you have a documented university excused absence and received prior approval. For more details visit the UNT Dean of Students' web page: <https://deanofstudents.unt.edu/resources>

Assignments:

Homework will be assigned but not graded. Solutions will be provided on Canvas and will be discussed in class.

Academic Dishonesty:

Cheating will not be tolerated. Anyone found guilty of cheating on a test or assignment will be awarded an F grade for the course. Discussions of problems and assignment with your classmates is welcome and encouraged, however, sharing of solutions is not. If you need help, you should ask the instructor. Cheating includes, but is not limited to, all forms of plagiarism and misrepresentation. For your rights and responsibilities please refer to <http://www.unt.edu/csrr>

Course Evaluation:

The Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider SPOT to be an important part of your participation in this class.

Disabilities Accommodation:

The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. 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 accommodation, please see the instructor and/or contact the Office of Disability Access at 940-565-4323 **during the first week of class**. Information and requests for supporting letters can be obtained from: <https://disability.unt.edu/>

Additional Policies and Procedures:

1. Attendance is mandatory. Every 3 unexcused absences will result in one letter grade reduction. If you know ahead of time that you will miss a class, contact me via email in advance. Attendance will be spot checked.

2. State common law and federal copyright laws protect my lectures. They are my own original expression. Whereas you are authorized to take notes in class thereby creating a derivative work from my lecture, the authorization extends only to making one set of notes for your own personal use and no other use. You are not authorized to record my lectures, to provide your notes to anyone else or to make any commercial use of them without expressed prior permission from me. Synchronous (live) sessions in this course will be recorded for students enrolled in this class section to refer to throughout the semester. Class recordings are the intellectual property of the university or instructor and are reserved for use only by students in this class and only for educational purposes. Students may not post or otherwise share the recordings outside the class, or outside the Canvas Learning Management System, in any form. Failing to follow this restriction is a violation of the UNT Code of Student Conduct and could lead to disciplinary action.
3. It is highly recommended that you turn your video (if using a webcam) and microphone off during the zoom meetings.
4. **Asking questions during the lecture:** it is highly recommended that you type your question in the chat window during the zoom meeting. You may also use your microphone to ask the question but understand that your voice will be recorded as part of the lecture recording.
5. This syllabus is subject to change at any time during the semester with changes to be announced in class.
6. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
7. To comply with FERPA policies, I will communicate via email (email me at kougianos@unt.edu) **but I will only respond to UNT email accounts.**
8. Each student should retain graded lecture notes, pop quizzes, homework, tests, software-generated files, and laboratory reports to document errors in recorded grades.
9. Challenges to the course grade must be presented within 60 days of receipt of grade notices mailed by the university. This will ensure that instructor's records are still available to allow a review of the assigned grade. You should first discuss your complaint with the instructor. If you wish to carry it further, contact the Program Coordinator by calling (940) 891-6872. To further pursue your complaint, contact the Department Chair, but **ONLY** after first discussing your concern with the previous two individuals
10. The Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider SPOT to be an important part of your participation in this class.

COVID-19 Impact on Attendance

While attendance is expected as outlined above, it is important for all of us to be mindful of the health and safety of everyone in our community, especially given concerns about COVID-19. Please contact me if you are unable to attend class because you are ill, or unable to attend class due to a related issue regarding COVID-19. It is important that you communicate with me prior

to being absent so I may make a decision about accommodating your request to be excused from class.

If you are experiencing any symptoms of COVID-19 (<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Hotline at 844-366-5892 or COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure. While attendance is an important part of succeeding in this class, your own health, and those of others in the community, is more important.

Class Materials for Remote Instruction

The UNT spring schedule requires this course to have fully remote instruction beginning January 12. Students will need access to a webcam and microphone to participate in fully remote portions of the class. Information on how to be successful in a remote learning environment can be found at <https://online.unt.edu/learn>.

Technology Requirements

- Computer.
- Reliable internet access.
- Speakers.
- Microphone (optional).
- Webcam (optional).
- [Canvas Technical Requirements](#) (The Respondus Lockdown Browser will NOT be used in this class).
- Microsoft Office Suite (available for free to all UNT students: <https://it.unt.edu/installoffice365>).
- Additional software (freely available) as specified.