

EENG 4720.001/5940.011 /5940.601
Embedded Controller Organization
Course Syllabus
SPRING 2024

University of North Texas
Electrical Engineering

Date Prepared: January 9, 2024

Prepared by: Elias Kougianos

Instructor: Elias Kougianos
Office: F140
Office Hours: TR 10:30—11:30 AM in F140
Phone: 940-891-6708
Email: Elias.Kougianos@unt.edu

Course web site: <http://canvas.unt.edu>
Time: TR 11:30AM—12:50PM PM
Meeting Place: NTDP B142

Course Number, Title, Credit Hours:

EENG 4720.001/5940.011/5940.601 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*, 4th Edition, ISBN 978-0982692677. The textbook is required. The 3rd edition is also fine.
- 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: 33.3%
- Exam 2: 33.3%
- Exam 3: 33.3%

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. 15 in B142* (Week 5)

Test 2 is on Thursday Mar. 28 in B 142* (Week 10)

Test 3 is on Thursday May 2 in B 142* (Week 15)

THERE IS NO FINAL EXAM FOR THIS COURSE.

*** Students with preapproved ODA arrangements will take all tests at the ODA Test Center**

During each test you can consult a printout of the Canvas slides and any other pre-approved handouts (they will be announced prior to the tests). No notes, textbooks or other material. During tests the use of electronic devices such as cell phones, smart phones, smart watches, pagers, photographic devices and/or other electronic or communication devices, with the exception of calculators, is strictly prohibited. Such devices must be turned off during the tests. You may also be asked to leave your backpacks by the classroom door.

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://studentaffairs.unt.edu/dean-of-students/resources>

Grade-related policies:

Turnaround Time

I aim to return graded work to you within one week of the due date. When this is not possible, I will send an announcement to the class.

Grade Disputes

You are required to wait 24 hours before contacting me to dispute a grade. Within that time, I expect that you will review the assignment details and reflect on the quality of the work you turned in. **You should then contact the grader and discuss the issue.** If you are not satisfied with the grader's response and you would still like to meet with me, email me to set up a meeting (I cannot discuss grade disputes over email). **In all email communications you should use your official UNT email account.** You should come to our scheduled meeting with specific examples that demonstrate that you earned a higher grade than you received. If you miss your scheduled meeting, you forfeit your right to a grade dispute. If you do not contact me to schedule a meeting within seven days of receiving your grade, you also forfeit your right to a grade dispute.

Extra Credit

There are no extra credit opportunities in this course.

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 <https://policy.unt.edu/policy/07-012>

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. 5 unexcused absences will result in an automatic course drop. If you know ahead of time that you will miss a class, contact me via email in advance. Attendance will be spot checked. Attendance will be taken promptly at 11:45AM. If you are not there when your name is called, you get an absence, even if you show up later.
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. 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. This syllabus is subject to change at any time during the semester with changes to be announced in class.
4. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
5. To comply with FERPA policies, I will communicate via email (email me at Elias.Kougianos@unt.edu) **but I will only respond to UNT email accounts.**
6. Each student should retain graded lecture notes, pop quizzes, homework, tests, software-generated files, and laboratory reports to document errors in recorded grades.
7. 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 discussing your concern with the previous two individuals
8. 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.
9. Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's [Code of Student Conduct](https://deanofstudents.unt.edu/conduct) (<https://deanofstudents.unt.edu/conduct>) to learn more.