EENG 4010/5940 Embedded Controller Organization
Course Syllabus
SPRING 2020
University of North Texas
Electrical Engineering

Date Prepared: January 7th, 2020

Prepared by: Elias Kougianos

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Course web site: http://canvas.unt.edu
Time: (Tu & Th) 4:00 pm – 5:20 pm
Meeting Place: NTDP B140

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.

Prerequisite(s): EENG 2710 (Digital Logic Design). Engineering or engineering technology majors.

Course Topics:

- Quick Review of Digital Logic
- Memory Types and Memory Organization
- History of ARM and Microcontrollers
- ARM Architecture and Assembly Language Programming
- Arithmetic and Logic Instructions and Programs
- Branch, Call and Looping in ARM Assembly
- Signed Arithmetic
- ARM Memory Map, Memory Access, and the Stack
- ARM Pipeline and CPU Evolution
- ARM and Thumb Instructions
- Floating-Point Arithmetic
- Embedded C Overview

Textbook(s) and/or required material:

- M. A. Mazidi, S. Naimi, S. Naimi, and S. Chen, "ARM Assembly Language Programming & Architecture", 2nd Edition, 2016, ASIN B01KB7QB90.
- Information about the textbook can be found [here](#).
- Additional material, as required, will be provided on Canvas.

Course Objectives:

a) Understand microcontroller technology. (1,2,5,6)
b) Understand the programming concepts and languages used to instruct microcontrollers. (1,2,3,4,6,8)
c) Understand how to use registers and memory. (1,2,3,6)
d) Understand the chip operation, including the system bus, operating modes, clocked operation, and memory technology. (1,2,3,6)
e) Understand subsystems for parallel, serial, programmable timer and analog interfacing. Some common hardware designs are introduced to interface the microcontroller to sensors and actuators. (1,2,5,6,8,11)
f) Understand how programs use the subsystems for application control (1,2,5,6,8,11,14,15,16)

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 February 20th (Week 6)
Test 2 is on Thursday April 2nd (Week 12)
The final exam will take place on Thursday May 7th 1:30PM – 3:30PM in NTDP B140

During each test (including the final exam) you can consult the textbook (open book tests) ONLY. No notes or other material. You will have full access to the course (Canvas) web site during all tests (including the final exam) but limited access to the internet. You will also have access to any required software.

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 will also be asked to leave you 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://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. 3 unexcused absences will result in 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.

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.

3. This syllabus is subject to change at any time during the semester with changes to be announced in class.

4. Cell Phones: Please remember to turn off phones prior to class.

5. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.

6. 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.**

7. Each student should retain graded lecture notes, pop quizzes, homework, tests, software-generated files, and laboratory reports to document errors in recorded grades.

8. Requests for review of graded work must be submitted during the lecture in which such work is returned to the students. The request should be accompanied by a written justification of the request including any supporting data.

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.