

EENG 3910.001 - Embedded System Design Project

Class time: 1:00 – 3:50 PM, Monday (Fall 2025)

Classroom: NTDP B227, **Lab:** NTDP B288

Instructor Information

Name: Dr. Xinrong Li

Pronouns: He/Him, Dr. Li

Office Location: NTDP B231

Phone Number: (940) 891-6875

Email: Xinrong.Li@unt.edu

Office Hours:

11:00 – 11:50am, Mondays and Wednesdays

Graduate Assistant's Name: Bryan Samuels

Pronouns: He/Him

Lab Location: NTDP B288

Email: BryanSamuels2@my.unt.edu

Lab Help Sessions:

2:30pm – 5:00pm, Tuesdays and Thursdays

Course Description, Structure, and Objectives

To study the fundamentals of microcontroller-based embedded systems, and the software and hardware design techniques for peripheral interfacing and communication, input/output signal interfacing, real-time processing and control, and embedded system development. Focus on hands-on software development with a high-level programming language such as C, and hardware design, implementation, and experiments with a microcontroller development platform.

Prerequisite(s): EENG 2905, EENG 2620 (and EENG 2621 for electrical engineering students), and EENG 2920, all of which must be completed with a C or better.

Must be completed with a C or better to pass.

Course Structure

This course has two components. One is the in-person lectures that may take about 2 hours during the designated class time. The second part of the course is the hands-on lab sessions to work on weekly lab assignments, which will take up the remaining time during the class period as well as some additional time out of the class period based on students' own schedule. Students can work on lab assignments in the lab classroom B288 following the laboratory access schedule. Students are strongly encouraged to install software packages that are required for lab assignments on their own computers so students can alternatively work on some of the lab assignments on their own computers. Throughout the semester, students are required to pick up the components and devices on the designated dates that will be announced in class.

Course Objectives

By the end of this course, students will be able to:

1. Understand basic concepts of embedded system design with microcontrollers;

2. Develop abilities to design and implement software for microcontroller systems;
3. Develop abilities to design and implement interfacing circuits for microcontroller systems.

Lab Safety Procedures and Guidelines

While working in laboratory sessions, students enrolled in EENG3910 are required to follow proper safety procedures and guidelines in all activities requiring lifting, climbing, walking on slippery surfaces, using equipment and tools, handling chemical solutions and hot and cold products. Students should be aware that UNT is not liable for injuries incurred while students are participating in class activities. All students are encouraged to secure adequate insurance coverage in the event of accidental injury. Students who do not have insurance coverage should consider obtaining Student Health Insurance. Brochures for student insurance are available in the UNT Student Health and Wellness Center. Students who are injured during class activities may seek medical attention at the Student Health and Wellness Center at rates that are reduced compared to other medical facilities. If students have an insurance plan other than Student Health Insurance at UNT, they should be sure that the plan covers treatment at this facility. If students choose not to go to the UNT Student Health and Wellness Center, they may be transported to an emergency room at a local hospital. Students are responsible for expenses incurred there.

How to Succeed in this Course

Communication expectations: UNT email and Canvas are the primary means of communication for this course. Students are expected to check their UNT email and Canvas course webpage daily. During busy times, my email inbox (Xinrong.Li@unt.edu) becomes rather full, so if you contact me by email and do not receive a response within two business days, please send a follow up email. A gentle nudge is always appreciated. Office hours and help sessions offer you an opportunity to ask for clarification or find support with understanding class material. The Canvas online system (<https://unt.instructure.com>) will be the learning management system that I will use to post lecture notes, reference documents, assignments, and announcements. Your lab assignment reports should be submitted in Canvas. Assignment grades will be available in Canvas within a week after submission.

ADA accommodation: The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the [Office of Disability Access](https://studentaffairs.unt.edu/office-disability-access) website (<https://studentaffairs.unt.edu/office-disability-access>). You may also contact ODA by phone at (940) 565-4323.

Academic success resources: UNT strives to offer you a high-quality education and a supportive environment, so you learn and grow. As a faculty member, I am committed to helping you be successful as a student. To learn more about campus resources and information on how you can be successful at UNT, go to unt.edu/success and explore unt.edu/wellness. To get all your enrollment and student financial-related questions answered, go to scrappysays.unt.edu.

Supporting Your Success and Creating an Inclusive Learning Environment

I value the many perspectives students bring to our campus. Please work with me to create a classroom culture of open communication, mutual respect, and belonging. All discussions should be respectful and civil. Although disagreements and debates are encouraged, personal attacks are unacceptable. Together, we can ensure a safe and welcoming classroom for all. If you ever feel like this is not the case, please stop by my office and let me know. We are all learning together.

Required/Recommended Materials

We will require a textbook and a number of reference materials as listed below:

- **Required textbook:** Dogan Ibrahim, *Nucleo Boards Programming with the STM32CubeIDE*, Elektor, 2020.
- Additional reference materials that will be posted in Canvas.
- Nucleo-L476RG Development Board and components package, all of which can be picked up from the department lab manager Mr. Todd Pumphrey in office B238.

Course Schedule

1. 08/18: First day of classes. Introduction
2. 08/25: GPIO (Lab 1)
3. 09/01: *Labor Day holiday. No class.*
4. 09/08: Timers and Interrupts (Lab 2)
5. 09/15: UART (Lab 3)
6. 09/22: ADC (Lab 4)
7. 09/29: DAC (Lab 5)
8. 10/06: DAC
9. 10/13: PWM (Lab 6)
10. 10/20: PWM
11. 10/27: Final project
12. 11/03:
13. 11/10:
14. 11/17:
15. 11/24: Thanksgiving Break
16. 12/01: Pre-finals week. Final project presentation. Final project presentation file due.
17. 12/08: Final exam week. No final exam. Final project report due.

Eagle Alert for campus closing: Students will be notified by Eagle Alert if there is a campus closing that will impact a class. The course schedule listed above is subject to change. Please refer to the [Campus Closures Policy \(https://policy.unt.edu/policy/15-006\)](https://policy.unt.edu/policy/15-006) for more details.

Assessing Your Work

Listed below are the graded activities for the course, along with the points possible. No extra credit activities will be assigned in this course. Late submissions of assignment/project reports are accepted with 1 point deduction per day for late submission penalty.

Graded Activities	Points Possible	Percentage of Final Grade
<i>Lab Assignments</i>	<i>Each assignment is graded on a 50-point scale</i>	50%
<i>Final Project (report and presentation)</i>	<i>Graded on a 100-point scale</i>	40%
<i>Class Attendance</i>	<i>Earn 1 point by attending one class. Up to 10 points in total for whole semester.</i>	10%

Final accumulated score computing formula:

$$\text{final_accumulated_score} = \text{average_of_lab_assignments} + 0.4 \times \text{final_project_score} + \text{class_attendance_score}$$

Final accumulated score is on a 100-point scale. Final letter grade is assigned based on the grade distribution listed below:

- A = 90 - 100
- B = 80 - 89
- C = 70 - 79
- D = 60 - 69
- F = 0 – 59

Every student can improve by doing their own work and trying their hardest with access to appropriate resources. Students who use other people’s work without citations will be violating UNT’s Academic Integrity Policy (<https://policy.unt.edu/policy/06-003>). Grades are based on mastery of the content. As a rule, I do not grade on a “curve” because that is a comparison of your outcomes to others. I do, however, encourage you to find opportunities to learn with and through others. Explore [Navigate’s Study Buddy](https://navigate.unt.edu) (<https://navigate.unt.edu>) tool to join study groups. If you have questions about this, or any UNT policy, please email me or come discuss this with me during my office hours. There are UNT policies and procedures that you can access on the [Student Support Services & Policies](https://clear.unt.edu/student-support-services-policies) page (<https://clear.unt.edu/student-support-services-policies>).

Attendance and Participation

Attendance in classes is mandatory for this course. Students are expected to attend class meetings regularly and to abide by the attendance policy established for the course. It is important that you communicate with the professor and the instructional team prior to being absent, so you, the professor, and the instructional team can discuss and mitigate the impact of the absence on your attainment of course learning goals. Please inform the professor and instructional team if you are unable to attend class meetings because you are ill, in mindfulness of the health and safety of everyone in our community.