



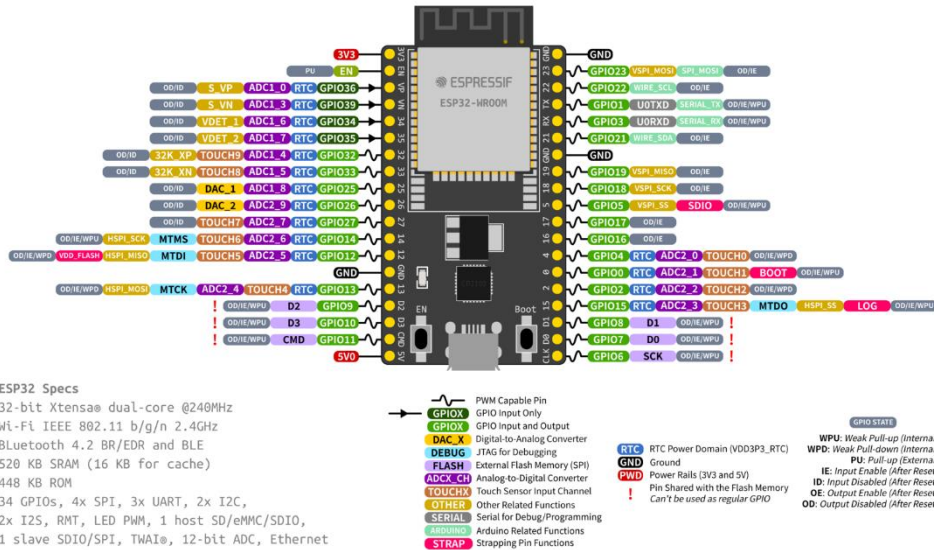
**Electrical and Computer Engineering Department**  
**ECE 4154 - ECE 5190 Special Topics Lab in ECE**  
**Laboratory for Microprocessor Systems II**  
**Fall 2024**

- ❖ **LAB DESCRIPTION:** Assembly language programming, C programming, basic computer architecture, introductory course on embedded system design.
  - **Corequisite ECE4354 / ECE5390:** The content of the lab assignments is associated with this class. Please note that the lab is 1 credit hour, and the grade for that lab is calculated separately from the grade in the class.
  - **Prerequisite ECE 2304 & ECE2104:** Microprocessor Systems I and Laboratory, minimum grade of “C”.
  - **Lab sessions:** The student is responsible for completing the lab, demonstrating the work, and meeting with the Teaching Assistant at the formally scheduled time assigned to the section in which the student registered.
  - **Instructor:** Dr. Miroslava Barua, [mbarua@utep.edu](mailto:mbarua@utep.edu)
  - **Teaching Assistant:** Humaira Arif, [harif@miners.utep.edu](mailto:harif@miners.utep.edu)
  
- ❖ **REFERENCES:**
  - ESP32 Technical Reference Manual ([espressif.com](http://espressif.com))
  - The FreeRTOS Reference Manual ([www.freertos.org](http://www.freertos.org))
  
- ❖ **TECHNOLOGY REQUIREMENTS:**
  - **Blackboard (BB) shell** – Most course content is delivered and collected via Blackboard, where you will find course resources, announcements, lab assignment handouts, etc. Make sure to **access all the additional resources posted on Blackboard.**
  - Use **@miners e-mail account** – official class communication using this domain
  - **Create PDF files** -- be able to create PDF files to upload reports.
  
- ❖ **COURSE OUTCOMES:** At the end of this course students will be able to:
  - Use development tools in the design and implementation of microprocessor-based systems
  - Use the ESP-IDF (Espressif IoT Development Framework) to implement microprocessor-based designs
  - Complete the design cycle for a Final Project including implementation, demonstration, presentation and report.

## ❖ COURSE MATERIALS:

- ESP32-WROOM-32 kit (Students must have their own)

ESP32-DevKitC



## ❖ Course Grading:

### Grades

Grading will be based on the standard scale

90% > A

80% - 89% = B,

70% - 79% = C,

60% - 69% = D,

Below 59% = F.

| Point distribution for lab grade: |             |
|-----------------------------------|-------------|
| Pre-lab.....                      | 5%          |
| Demonstration .....               | 30%         |
| Lab report.....                   | 25%         |
| Code .....                        | 20%         |
| Final Project.....                | 20%         |
| <b>TOTAL:</b>                     | <b>100%</b> |

## ❖ Laboratory Guidelines:

Lab assignments will count towards 80% of the grade, the final project will be 20% of final grade. Each lab assignment grade is determined by the following components:

1. **Pre-lab (5%)** – Students will get the corresponding laboratory assignment handout *before* going to the lab session. Students are responsible for completing the pre-lab portion and must submit their completed work via Blackboard by the due date.
2. **Demonstration (30%)** – Demonstration occurs during corresponding lab session. The TA will assess the student’s understanding of the lab assignment and implementation. Demonstration will begin well before the session ends to give opportunity to all students to show their work.

*\*If the lab implementation is not completed by checkout time, you still need to show your work. **DO NOT** leave the lab session without showing your progress to the TA (to receive partial credit where applicable).*

3. **Lab report (25%)** – Students must prepare a lab report and submit it as a single PDF file by the due date. The lab report **MUST** include the following:
  - a) **Cover page** - With student's name, lab name, lab session, lab assignment number and title, and due date.
  - b) **Instrumentation used** – List the *software* and *hardware* used.
  - c) **Design Implementation** – Each student will describe the purpose of the lab, the steps used during the design process and show how it was implemented.
  - d) **Conclusion** – Paragraph about what you learned, issues you had and how you fixed them.
  - e) **Code** – Include your code with corresponding comments to be properly documented.
4. **Code (20%)** – Students must submit **program source code** file via Blackboard using the following naming format: *Lastname\_LabNumber.c*  
If a submitted file is corrupted it will receive no grade.

✚ **Graduate Students:** If you are a **graduate student** taking this lab as part of your degree plan, please note that you are responsible for completing all work required of undergraduates **and**, in addition, you are expected to:

- Successfully complete additional requirements for **final project** and
- **Maintain an 80% average** (minimum)

Failure to comply will warrant a failing grade in the lab

❖ **LAB SESSIONS:** Topics and peripherals you will be expected to demonstrate throughout the semester as well as the Final Project:

Lab 0: LED Lightshow

Lab 01: LED Controller

Lab 02: Microwave – Interrupt System

Lab 03: Introduction to FreeRTOS

Lab 04: FreeRTOS: Semaphores

Lab 05: FreeRTOS: Queue

Lab 06: GPIO, Interrupts, and Queues

Lab 07: Peripherals and Queues: ADC and PWM (LEDC)

Lab 08: DAC Peripheral

Lab 09: WIFI and IOT

Lab 10: WIFI and IOT: Servo Motor Control

Lab 11: WIFI and IOT: ADC Monitor

### ❖ FINAL PROJECT:

Final Project design requirements will be provided. Student must demonstrate all techniques learned during the lab, points will be deducted for techniques not demonstrated or ignored. By this time, you will be expected to have a fair understanding of all concepts, and as such, will only be provided with troubleshooting assistance. *\*\*Undergraduate students might be allowed to work in a team, graduate students will do individual projects. More details will be provided with the project requirements.*

### ❖ COURSE & UNIVERSITY POLICIES

- **Attendance** - Attendance is **mandatory** and is key to your success in the lab. You are required to attend your corresponding section of the Lab and to **be on time**.
- **Resource access** - Each week you will be able to access Blackboard to obtain resources corresponding to each lab assignment.
- **Deadlines** – Notice and meet all *Prelab* and *Lab Report* submission deadlines. Late work will only be accepted in the case of illness or an emergency; you are responsible for notifying TA as soon as possible (ideally before the deadline) of the situation (illness or emergency) necessitating late submission of work. Late work may be graded with penalty points.
- **Lab Reports** should be written by each student **individually** and uniquely in his/her own style but following the order of the required lab report parts.
- **Any makeup work** will require the TA approval and shall be presented either during session, office hours or by appointment with TA.
- **Samples** of student work will be collected for quality assurance purposes. Please notify the professor, in writing, if there is any confidentiality requirement about any work that is submitted.
- All work must have good **presentation and be legible** to obtain full credit.

**COPYRIGHT STATEMENT FOR COURSE MATERIALS:** All materials used in this laboratory (such but not limited to assignments, handouts, reference material, etc) are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. **You may not further disseminate (i.e., share, send or post) any class materials/resources outside of this course. Doing so may result in disciplinary action.**

**ACADEMIC DISHONESTY:** As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform forms the basis for departmental and institutional quality. All students within the Department are expected to observe appropriate standards of conduct. Acts of scholastic dishonesty such as cheating, plagiarism, collusion, the submission for credit of any work

or materials that are attributable in the whole or in part to another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts will not be tolerated. Any case involving academic dishonesty will be referred to the Office of Student Conduct and Conflict Resolution (OSCCR). See the OSCCR homepage at <https://www.utep.edu/student-affairs/osccr/> for more information.

**AMERICAN DISABILITIES ACT:** If you feel you may have a disability that requires accommodations, contact the Center for Accommodations and Support Services (CASS, <https://www.utep.edu/student-affairs/cass/>) at 747-5148 located in the Union East, Room 106. Make sure to talk to TA at the beginning of the semester to discuss necessary accommodations.

#### COVID-19 PRECAUTIONS:

Please stay at home if you have been diagnosed with COVID-19 and send an **email as soon as possible** to TA **and** instructor.

If you are experiencing symptoms, it is recommended that you get tested immediately and wear a mask or face covering. COVID-19 testing options are available for free on campus for registered students. For updated information about **on-campus testing** visit:

<https://www.utep.edu/ehs/covid/>

<https://www.utep.edu/chs/covid-testing/index.html>

#### COVID-19 Illness Reporting:

For the safety of the campus community, it is very important to be informed. If you have any questions or concerns about COVID-19, you can contact UTEP EH&S at [covidaction@utep.edu](mailto:covidaction@utep.edu) . For updated information visit: <https://www.utep.edu/ehs/covid/>