



Electrical and Computer Engineering Department
ECE 4153 Digital Systems Design II -Laboratory
ECE 5190 Special Topics Lab in ECE: Digital Systems Design II -Laboratory
Spring 2024

- ❖ **Lab Description:** Design and verification of digital systems using simulation and prototyping board. Laboratory implementation using standard, integrated circuits and programmable logic devices.
 - **Corequisite ECE4353 / 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.
 - **Pre requisite 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.
 - **Course Outcomes:** At the end of this course students will be able to:
 - Utilize the standard design sequence outlined below to create Digital Logic Systems
 - Use the Xilinx Vivado development environment to implement designs;
 - Implement Digital Logic Systems in various forms;
 - Design Verilog (HDL) modules in the development platform.
 - **Overall Design Sequence:**
 - I. Design Creation (Schematic or HDL)
 - II. Synthesis (Create design into a gate-level netlist)
 - III. Constraints (Specify timing constraints and I/O assignment)
 - IV. Implementation (Compile design into place and route design)
 - V. Result Analysis (Run a test bench and look at ISM simulation results to make corrections if necessary)
 - VI. Debug (Close ISM, edit, and try again)
 - VII. Device Programming (Download design into device)

❖ **Technology Requirements:**

- **Blackboard (BB) shell** – Most course content is delivered and collected via Blackboard, where you will find course resources, announcements, lab assignment handout, etc. Make sure to **accesses all the additional resources posted on Blackboard** and be prepared to use **Gradescope tool**.
- Use **@miners e-mail account** – official class communication using this domain
- **Create PDF files** -- be able to create PDF files to upload assignments onto **Gradescope** {convert directly from Word to PDF. When necessary, use a scanner or use a scanning App to convert any necessary handwritten work to PDF}

❖ **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 each lab:

Pre-lab.....25%

Demonstration

Verilog modules.....25%

Simulation/ FPGA Board.....25%

Lab report.20%

Attendance/Preparedness..... 5%

TOTAL: 100%

❖ **Laboratory Guidelines:**

Each lab grade is determined by the following components:

1. **Pre-lab (25%)** – Students will get the corresponding laboratory assignment handout *before* going to the lab session. Students are responsible for completing the pre-lab activities and must submit their completed work via Blackboard tools by the due date. Pre-lab activities include important preliminary **design** of the lab assignment. Failure to complete the pre-lab will seriously hinder your ability to complete the in-lab work.
 - **Uploaded Pre-lab** work may be handwritten but afterwards it **MUST** be transformed into a single legible PDF file. **DO NOT submit work as separate picture files**, make sure your submission is a single **PDF file**.
 - *If you do not have access to a scanner, you may use other tools/programs in your computer or a smartphone application that creates a **single-PDF** file. Such applications allow you to edit/add/remove pages/images and create a final PDF document. Such file must be organized in the corresponding order and the name of the file must follow this format: “*Lastname_Prelab#X*”*
2. **Demonstration (50%)** – Demonstration occurs during corresponding lab session. During demonstration, the TA will assess the student’s understanding of the lab assignment and implementation. Students need to attend their lab session **with their pre-lab to be used for reference**. After completing the **lab procedure work**, students need to demonstrate their results to the TA well *before* the end of their lab session.


Students must have pre-lab and working design ready at time of demonstration. **Demonstration will begin well before the session ends** to give opportunity to all students to show their work:

- Show and explain your circuit **HDL** modules – *worth 25% of total demo*
- **Simulation** and **board implementation** of completed circuit – *worth 25% of total demo*

If the circuit simulation doesn't work 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 (20%)** – Students must prepare a lab report, and submit it as a single PDF file by the due date. The report **must** contain legible screen capture/files of each HDL module and waveform simulations. The lab report **MUST** include 5 parts in the **EXACT** order as described below:
 - a) **Cover page** - With student's name, lab name, lab session, lab number, and due date
 - b) **Instrumentation used** – List the *software* and any *hardware* used.
 - c) **Design Implementation** – Each student will describe the steps used during the design process and how it was implemented. Include **CLEARLY LABELED** coded HDL modules (with corresponding comments beside the code)
 - d) **Results** – Include simulation (waveforms) along with corresponding explanation/interpretation of the results.
 - e) **Conclusion** – Paragraph about the assignment and lessons learned

** Points will be deducted for each item that does not follow the format*
4. **Attendance/Preparedness (5%)** – Students must attend corresponding lab session and **be on time**. Students **must** come well prepared: this means you **must** review resources such as handouts, prelab solutions and instructions ***before*** the session.

 **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 a **final project** (worth **10 %** of the final grade); and
- **Maintain an 80% average** (minimum)

Failure to comply will warrant a failing grade in the lab

❖ 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 If you have any questions or concerns about COVID-19, you can contact UTEP EH&S at covidaction@utep.edu . For updated information visit: <https://www.utep.edu/ehs/covid/>