

**EE 2169 – “Lab for EE 2369”**  
**Digital Systems Design I Lab**

❖ **Lab Description:** Implementation and testing of combinational and sequential digital systems.

**Prerequisite:** EE 1305 and EE 1105, each with a grade of “C” or better; or CS 1301 and CS 1101, each with a grade of “C” or better; or CS 1401 with a grade of “C” or better.

**Co-requisite:** EE 2369 (Digital Systems Design I). There are hardware projects and software simulation projects, performed in this lab, that are associated with this class. The student is responsible for completing the labs, and meeting with the Teaching Assistant at the formally scheduled time assigned to the section in which the student registered. Please note that the lab is 1 credit hour, and the grade for that lab is calculated separately from the grade in this class.

**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 ISE development environment to implement designs;
- Implement Digital Logic Systems in various forms;
- Design via Verilog (HDL) or schematic capture modules found in the development platform.

**Design Sequence:**

- 1) Design Creation (schematic capture or HDL)
- 2) Synthesis (create design into a gate-level netlist)
- 3) Constraints (specify timing constraints and I/O assignment)
- 4) Implementation (compile design into place and route design)
- 5) Result Analysis (run a test bench and look at ISM simulation results to make corrections if necessary)
- 6) Debug (close ISM, edit, and try again)
- 7) \*Device Programming (download design into device)

❖ **Course Format: Online with Synchronous & Asynchronous components**

- The delivery format of EE2169 lab will be **100% online with synchronous and asynchronous components. The lab format is defined as Hybrid-Lab with targeted engagement** {meaning some laboratory activities are planned for specific days, with the remainder of lab content and learning activities being done online synchronously or asynchronously}.
- Accessible **asynchronous** content → **Asynchronous** means students will be able to access resources {lab assignments, recorded video lectures, and other provided materials} at their own time (without a designated time) **and work at their own pace.** Lab resources will be delivered through our lab Blackboard shell in asynchronous mode. Please be proactive and complete these academic activities by diligently keeping track of

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your own progress. You will be able to submit lab materials using the upload links located in our Lab Blackboard shell.

- **Synchronous lab sessions** → **Starting the second week of classes** (week of August 31-Sept 4<sup>th</sup>) students are **expected and required** to meet remotely with corresponding TA once a week by login into Blackboard Collaborate for a virtual lab session during their designated day and time as stated on Goldmine.
  - What is the *purpose of the specific day/meeting time*? It is crucial that we keep the scheduled day/time so students can meet with their TA in a live-virtual session to do **demonstrations of lab assignments**. During these live-sessions students will have the opportunity to ask questions {on chat or audio/video} and share screens as they complete the synchronous demonstrations.
- A “**Lab Schedule ~ Week-by-week**” explicit calendar will be provided to help you be proactive and diligently keep track of the synchronous and asynchronous lab activities that must be completed each week. Make sure to monitor your own progress specially as you work on the asynchronous activities and **meet the posted deadlines**

#### ❖ **Technology Requirements:**

- **Blackboard (BB) shell** - Course content is delivered via the Blackboard Learning Management System (LMS), where you will find all our course resources, announcements, virtual offices, virtual lab room for synchronous lab sessions, lab assignment handout, etc. Make sure to **accesses all the additional resources posted on Blackboard** (recorded-mini-lectures, ‘*how to..*’ instructions, reference materials, etc)
  - **Internet connection** that allows one-on-one video conferencing via **Blackboard Collaborate sessions with TAs during virtual lab sessions and/or virtual Office hours** (live one-on-one communication)
  - Use **@miners e-mail account** – official class communication should using this domain
  - **Access to a laptop/desktop** – Device should be enabled with **webcam, microphone and ability to install required software**.
  - Device capable of running **Xilinx ISE 14.7** {installed on your device or accessed via MyApps or via VPN to a local work station in any of the two on-campus Laboratories} – instructions will be posted on Lab Blackboard.
  - Access **Autodesk’s Tinkercad** design software which will be used for ‘Hardware visualization’ laboratory assignments.
  - **Create PDF files** -- be able to create PDF files to upload assignments {*by converting directly from Word to PDF, use a scanner or use a scanning App*}
- ✚ Please take a look at the “**To-Do List**” posted in the Lab Blackboard shell, you will be expected to complete all those tasks to be ready to take part in the laboratory learning activities. **Your designated TA will provide more details about these requirements during first lab session.**

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#### ❖ Communication

- **Discussion Boards** within the Blackboard shell -- Will be used for frequently asked questions, technical issues, and discussions of constructive content related to our laboratory. If you need help, **please check out the discussion board to see if your question has been answered previously, and if not, participate in the discussion boards by posting your question, comments or thoughts!** Please respond to other students' questions if you have a helpful response, this will help create a sense of community and will give you an opportunity to engage with your classmates.
- **Virtual Office hours** -- If you require help, please remember you can reach out to your **TA** during lab session, via email or by visiting during Virtual Office hours
- **Classroom NetEtiquette/ Student Conduct** -- Remember that you must be courteous, respectful and professional in the way you address others; either in writing (email, chat, discussion boards), during lab sessions or during one-on-one sessions at virtual office with instructor and lab TAs. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action
  - Respect and courtesy must be provided to classmates, TAs and instructor at all times. No harassment or inappropriate postings will be tolerated.
  - When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a F2F situation.
  - Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted in these online spaces is intended for classmates and instructor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

#### ❖ Lab Guidelines

Each lab is divided into three important tasks: *Pre-lab, Demonstration, and Lab Report*. Students can access the instructions for the PRELAB on the LAB HANDOUT, available on BlackBoard. Students are responsible for working on the PRELAB, which is hand written and typically includes a preliminary design for the lab assignment. Note that this work is to be completed prior to lab, and uploaded to Black Board by the deadline indicated on BlackBoard. **The PRELAB will be graded.**

The Laboratory (Procedure) will be carried out during the assigned synchronous lab session using Blackboard Collaborate environment. Group discussion is strongly recommended, but each individual must submit their own work.

Apart from the assigned TA for your lab section, there are other TAs administering different lab sections who can also help with questions. However, completed labs can only be checked by the

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assigned TA. If a student fails to demonstrate work during the lab “checkout” time, arrangements must be made to demonstrate the circuit during another designated time and points will (potentially) be deducted.

At the start of the lab session students should have their PRELAB on hand. Before calling the TA for demonstration of your circuit operation (“checkout”), make sure everything is ready (graded/corrected PRELAB, circuit to be tested in software). **Also, students should be prepared to answer questions pertaining to the lab.** If the circuit simulation doesn’t work at checkout time, the lab will be graded for partial points. Extra time will be allotted, but points will be deducted, as deemed necessary.

You must submit a **formal lab report** with neatly drawn figures, diagrams, or embedded screenshots, as necessary. The lab report will include a cover page showing your name, lab name, lab number, due date. The graded PRELAB will be the first page(s). The written report format should contain the following sections:

- Objective
- Equipment Required
- Procedure and Testing/Verification/Results
- Conclusion (questions are typically provided to guide the student)

An MSWord Template will be provided for the Lab Report. If the lab included generation of an HDL program, please make sure that a listing of the program is included (either embedded in the report, or attached as an Appendix to the Report), and ensure that it has the required comments and documentation.

**❖ Course Grading:**

**Scale for Letter Grade mode:**

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

**Lab Grading Rubric:**

- |    |   |        |
|----|---|--------|
| 1) | <b>Pre-Lab</b> .....                      | 20 pts |
| 2) | <b>Lab Demonstration &amp; Quiz</b> ..... | 40 pts |
| 3) | <b>Formal Lab Report</b> .....            | 30 pts |
| 4) | <b>Conclusions</b> .....                  | 10 pts |

- 1) **Uploaded Pre-lab** work may be handwritten but afterwards **MUST** be transformed into a single legible 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** from multiple captures made from your phone’s camera. Such applications allow you to edit/add/remove pages/images and create a final PDF document. Such file must be organized

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*in corresponding order and the name of the file must follow this format:*

*“Lastname\_Prelab#X “.* **There will be Blackboard upload assignment link to submit your work**

- 2) **Demo** via Blackboard Collaborate Ultra session during corresponding Lab session (keep **same meeting day & time** as given on Goldmine enrollment)
- 3) **Report uploaded** via Blackboard assignment link. **Reports MUST be submitted as a SINGLE PDF document.** *File must be legible, items must be organized in corresponding order and the name of the file must follow this format: “Lastname\_Report#X”*
- 4) **Conclusions**→Included in the Lab report.

**❖ Lab Report Guidance:**

You will be provided with a Lab Assignment (write-up) on a weekly basis. It will have a short reading assignment, Pre-Lab assignment (preparation for the lab), Lab Procedure, and some guiding questions for writing your conclusion.

**Pre-Lab:**

- Calculations (tables, diagrams, K-maps, etc.)
- Justifications – 1 paragraph

**Lab Procedure and Results:**

- Steps involved in the procedure
- Schematics, HDL, screenshots (pictures), Simulation, etc.
- Justifications – 1 paragraph
- Notes on any problems encountered, and solutions implemented

**Demonstration:**

- Demonstrate working software, simulation Teaching Assistant

**Conclusions:**

- Discussion of the objective of the lab (given in the Lab Assignment), and what was learned during this lab. Answer questions given in the Lab write-up, which are intended to guide your conclusions.

Some general questions that could be addressed here are:

- What is the relationship between the course lecture and how you implemented this lab?
- Comment on expected and unexpected results during the lab procedure.
- How is what you did in this Lab seen in technologies in the real world? Give examples.

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❖ **Course Policies:**

- You are required to **remotely** attend the section of Lab in which you are registered, and to be on time.
- Each week you will be able to **access all resources corresponding to the corresponding Lab assignment**
- Pre-Lab Assignments are work assignments to be completed in preparation for your lab attendance.
- Pre Lab work should be submitted on BlackBoard by the deadline indicated (all times are local El Paso– Mountain Standard Time zone.)
- Pre-Lab work is typically done by hand, so it can be scanned and uploaded to BlackBoard. **DO NOT submit work as picture files** of your Pre-Lab work, make sure your submission is a **PDF file**.
- Lab assignment demonstration should be completed during the synchronous lab session. Each student must present a working demonstration of the lab assignment to the instructor **before the end** of the lab session in order to earn full credit. Getting assistance or assisting other students is allowed, as long as one student does not perform the other’s lab procedure.
- Lab Reports are due by the date indicated on BlackBoard, and must always be written by each student **individually** and uniquely in his/her own style. NOTE: there is a handout on PROFESSIONAL ENGINEERING WRITING STYLE in the “Lab Guidelines” folder on BlackBoard.
- A Lab Report TEMPLATE, is provided can also be found in the “Lab Guidelines” folder on BlackBoard. This will allow you to use MSWord and create your **individual Lab Report** (complete with screenshots of your circuit, simulation and/or implementation). Once completed, you can save as a PDF document and submit it using BlackBoard upload links.
- Late assignments will NOT be accepted without **written** medical, legal, military, or work justification. Special circumstances will be considered if reported in time. Makeup labs are by appointment only.
- 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 for full credit.

**Copyright statement for course materials:** All materials used in this laboratory (such but not limited to recordings, assignments, handouts, quizzes) 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 be further disseminated (i.e. share, send or post) any class materials/resources outside of this course. Doing so may result in disciplinary action**

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**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, taking an examination for 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 <http://sa.utep.edu/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, <http://sa.utep.edu/cass>) at 747-5148 located in the Union East, Room 106.

**COVID-19 Accommodations** -Students are not permitted on campus when they have a positive COVID-19 test, exposure or symptoms. If you are not permitted on campus, you should contact me as soon as possible so we can arrange necessary and appropriate accommodations.

**COVID-19 PRECAUTIONS:** You must STAY AT HOME and REPORT if you (1) have been diagnosed with COVID-19, (2) are experiencing COVID-19 symptoms, or (3) have had recent contact with a person who has received a positive coronavirus test. Reports should be made at <http://www.screening.utep.edu>. If you know of anyone who should report any of these three criteria, you should encourage them to report. If the individual cannot report, you can report on their behalf by sending an email to [COVIDaction@utep.edu](mailto:COVIDaction@utep.edu).

For each day that you attend campus—for any reason—you must complete the questions on the UTEP screening website ([screening.utep.edu](http://screening.utep.edu)) prior to arriving on campus. The website will verify if you are permitted to come to campus. Under no circumstances should anyone come to class or campus when feeling ill or exhibiting any of the known COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. Students are advised to minimize the number of encounters with others to avoid infection. Wear face coverings when in common areas of campus or when others are present. You must wear a face covering over your nose and mouth at all times in this class. If you choose not to wear a face covering, you may not enter the classroom or other facilities. If you remove your face covering, you will be asked to put it on or leave. Students who refuse to wear a face covering and follow preventive COVID-19 guidelines will be dismissed from the class and will be subject to disciplinary action according to Section 1.2.3 Health and Safety and Section 1.2.2.5 Disruptions in the UTEP Handbook of Operating Procedures