University of Texas at El Paso
ECE 2303/EE 2369: Digital Systems Design I
Spring 2024

Instructor  Dr. P. Nava
Office      Engineering A-319 or virtually via Microsoft Teams
Office Hours 3:00 to 4:00 on Mondays and Wednesdays
             Other times by appointment

Course Delivery: How this class is taught
HyFlex (In-person/Synchronous/Asynchronous). This is a teaching style where the instructor will be delivering the lecture, in-person, in the assigned classroom, but also transmitting live via TEAMS. The lecture is also recorded, and will be posted on BlackBoard, along with the printout of PowerPoint slides, if used. In this manner, the student has the option of attending the live class presentation, attending virtually via TEAMS, or watching the class presentation later.

REQUIRED COURSE MATERIALS

1. **Textbook:** Digital Design: with an Introduction to the Verilog HDL, VHDL, and System Verilog
   **Authors:** M. Morris Mano and Michael D. Ciletti
   **Edition:** 6th Edition
   **Publisher:** Pearson
   **ISBN-10:** 9780134549897  **ISBN-13:** 978-0134549897

2. **Electronic Textbook from zyBooks:** “Digital Systems Design I”
   - You need to subscribe (cost is $64) through the link BlackBoard: [Click on the zyBooks link located on BlackBoard](#). **DO NOT** go to the zyBooks website and create a new account!
   - **To Subscribe:** follow the illustrated step-by-step instructions listed in the file entitled “How to register and access ZyBooks,” which can be found in the BlackBoard module HomePage>HowTo…Instructions.

3. **Technology Requirements**
   - **Access to our BlackBoard (BB) shell** – Some course content will be delivered via the BlackBoard (BB) Learning Management System (LMS). BB has course resources, announcements, link to read zyBooks, participate in homework, and submit assignments.
   - **Use of @miners.utep.edu email account** – all official class communication will use this domain. All email concerned with the course will have an “EE2369:” or “EE2303:” prefix to the subject line. An example is provided on the last page of this handout.
   - **Access to a computer --**
You will need a laptop or desktop computer to read, prepare, and complete assignments. NOTE: exams will be scheduled outside of class, on a link within BB.

- If needed, you can check out equipment from the Library, Room 300. Visit this link for more details: [https://www.utep.edu/technologysupport/TSCenter/tsc_eqcheckout.html](https://www.utep.edu/technologysupport/TSCenter/tsc_eqcheckout.html)

- **Ability to create PDF files** – Creation of PDF files is necessary in order to upload assignments by converting directly from Work to PDF, using a scanner, or using a scanning app.

You will need the tools listed above for content delivery, assignment submission, and assessment activities (quizzes and exams). Detailed instructions for these tools can be found in the “HowTo…Instructions” module in BB.

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**COURSE DESCRIPTION: What this class is about**

In Digital Systems Design I you will learn about design and synthesis of digital systems using both combinational and sequential circuits. You will start by fully understanding and designing small scale integration (SSI) systems and use modular design towards designing Medium Scale (MSI) and Large Scale (SSI) Integration systems. You will learn different design techniques and be able to verify your solutions with analysis techniques.

**Prerequisite:** One of {EE1305 or ECE1300 or CS 1301 or CS1401} with a grade of “C” or better.

**Co-requisite:** EE 2169 (Lab for EE 2369) or ECE 2301 (Lab for ECE2303). Hardware projects and software simulation projects are performed in this lab associated with our class. Please note...
that the lab is 1 credit hour, and the grade for that lab is calculated separately from the grade in this class.

**Students successfully completing this course will be able to:**
1. Apply concepts of number systems to perform binary arithmetic and conversions.
2. Analyze & synthesize digital circuits, both combinational & sequential.
3. Design combinational circuits (binary adders, code converters, etc.) by using logic gates
4. Design sequential circuits (counters, registers, etc.,) by using flip-flops and other hardware
5. Design, simulate, implement and test digital circuits with hands-on (using physical devices) and with CAD tools.
6. Solve engineering problems with the Algorithmic State Machines (ASM) technique
7. Design, simulate, and test digital circuitry using Verilog Hardware Description Language
8. Design, implement, and test digital circuitry by prototyping designs using the selected development system.

### COURSE GRADING: How grade is calculated

**Letter Grades** will be based on the standard scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>100% - 90%</td>
</tr>
<tr>
<td>B</td>
<td>80% - 89%</td>
</tr>
<tr>
<td>C</td>
<td>70% - 79%</td>
</tr>
<tr>
<td>D</td>
<td>60% - 69%</td>
</tr>
<tr>
<td>F</td>
<td>Below 59%</td>
</tr>
</tbody>
</table>

Your final grade is earned by your active participation and performance in the components shown in the Table to the right.

**NOTE:** the Final Exam is not shown in the Table because it will serve the purpose of replacing one of the three exams, if needed.

<table>
<thead>
<tr>
<th>Course Grade Distribution</th>
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</thead>
<tbody>
<tr>
<td><strong>Exam #1</strong></td>
</tr>
<tr>
<td><strong>Exam #2</strong></td>
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<tr>
<td><strong>Exam #3</strong></td>
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<tr>
<td><strong>Homework and Quizzes</strong></td>
</tr>
<tr>
<td><strong>Instructor Assessment</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

**Exams:** There will be three exams (1, 2 and 3, all equally weighted) to assess your knowledge of the digital systems design techniques studied during each period of the course. You should use your own notes, homework problems, examples, reference materials, quizzes, and handouts as your study guide for the exams. The use of calculators or other electronic devices is strictly prohibited during all exams/quizzes. Refer to the associated “Course Schedule” for estimated exam dates. Official exam dates will be announced in a timely manner.

- No exam score will be dropped; however, you have the option to replace a low score in one of the exams, with the score on a comprehensive final exam (all chapters in the
semester). Be aware that a comprehensive exam covers all topics in the semester, and that you must have taken all 3 exams to qualify for this option.

- If you miss an exam without having an approved excuse, a grade of “zero” will be assigned for that exam.
- If there is an extenuating circumstance that can cause a student to miss one examination, the student must notify instructor immediately. If the circumstance warrants an excused absence approved by the instructor, student will qualify to take a COMPREHENSIVE exam at the end of the semester to replace that one missed exam. The student must have taken the other two exams to qualify for this replacement.
- If you qualify and wish to take the comprehensive final, you will have to notify the instructor about your intention of taking the comprehensive exam (more details later in the semester).

**Homework:** A portion of your content mastery depends on completion of homework assignments, so make sure you understand and can solve all the problems by yourself. Remember you can ask questions and seek immediate assistance from the different resources provided for you (Office Hours, Textbook, ZyBook, Lab Teaching Assistants, etc.). You are responsible for doing the homework, even though it may or may not be collected. Homework assignments will include:

- **Problem Sets** – Series of problems will be assigned for you to practice your design and analysis skills. When these problem sets are collected, you must submit them by scanning and uploading it to the portal provided on BlackBoard as a single PDF file. Good homework presentation ~ including neat/legible PDF scanned files~ are expected and required. To be able to receive full credit, each homework must have:
  1. a cover sheet (with Student’s Name, course number (ECE 2303 or EE 2369 – NOTE: this is not the CRN, which changes every semester);
  2. assignment number; and
  3. due date.

  Problems should be presented in the same order as listed on the assignment instructions and final answers clearly marked with a box around it (if possible).

- **Reading Assignments** – Read the assigned sections from the textbook, reference materials, and from the ZyBooks electronic book (refer to ‘Course Schedule’ for reading sequence). The sections corresponding from ZyBooks will include interactive “participation and challenging activities” which will count towards your grade. You **MUST** click on the corresponding ZyBook Assignment links posted on Blackboard to submit your work and have your grade appear in the BlackBoard gradebook. (NOTE: I reserve the right to switch to a GradeBook on my computer, which will not give you a report of your grades on BlackBoard.) To give students extra time, most weekly ZyBook assignments will be due by Sunday at 11:59PM (not midnight). Refer to official deadlines stated on each assignment.

All homework assignments must be completed by the posted deadline. Late homework will only be accepted in the case of illness or an emergency; you are responsible for notifying me as soon
as possible (ideally before the deadline) of the situation (illness or emergency) necessitating late submission of homework.

**Quizzes:** A portion of your grade may come from quizzes so make sure to be well prepared for them in a timely manner. Quizzes will assess your completion and understanding of homework assignments (based on problem sets and reading) as well as your basic understanding of the class material. The intention of the quizzes is to encourage you to stay on track with the class material. Please note that:

- No make-up quizzes will be given; however, your lowest quiz score will be dropped.
- Quizzes will be administered on paper or using the assessment tool on BlackBoard (online quiz), and how to access it using your electronic devices.

**Instructor Assessment:** This assessment is based on your active participation in all the course activities: quizzes, homework, completion of reading assignments and in-class participation. Each of these activities will be given point values that add up to the total instructor assessment portion of your grade. Because these activities are designed to contribute to your learning each week, there is no way to “make up” these points after their due date has passed.

**Extra credit:** If needed, extra credit may be assigned to the ENTIRE CLASS ONLY. No individual can request to present work for extra credit. When needed, optional questions/challenge problems will be added to assignments, quizzes, or exams that will count as extra credit.

**Course Schedule:** This information is available on Blackboard as a separate document highlighting topic sequence, key assignments, important dates and activities. This document is subject to changes at the discretion of the instructor to adapt to the needs of the class.

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**COURSE COMMUNICATION and LEARNING ENVIRONMENT**

**Office Hours:** You are highly encouraged to interact and talk one-on-one, or small groups, with me about your questions and comments related to the course. You can either stop by my physical office located at room A-319 or connect via using Microsoft Teams (send me a TEAMS chat prior to connecting to ensure that you have my attention and I am not otherwise occupied).

Please send me an email (or TEAMS chat) if you have schedule conflicts and need to make an appointment to meet with me outside the posted office hours. Please notice you can also seek assistance by contacting a member of our ECE2303/EE 2369 instruction team (Lab TAs).

**E-mail Communication:** Send all your class related e-mails to pnava@utep.edu. Due to high volume of emails received, please be patient and be certain that your email will receive a response within 24-48 hours of receipt. Please do not wait until the last minute to send me a message about something that is due in a few hours or the next day because—due to response window—the response may not get back to you in time to meet a deadline.
Make sure the message’s subject description has prefix “EE2369:” or “ECE2303:” followed by the rest of the message’s subject (Example: “EE2369: Question about homework”). In the body of email, clearly state your question. All this will help receive a quicker response time! Send all messages from your Miners account and include your name at the bottom.

**Announcements:** Check the Blackboard announcements and your miners email for any updates, deadlines, or other important messages.

**Classroom Etiquette/ Student Conduct:** Remember that you must be courteous, respectful, and professional in the way you address others. Therefore, please keep these 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 bad attitude or harassment will be tolerated. (Remember that we are preparing you for the profession: not just academic material, but also professional courtesy and all behaviors resulting in a psychologically healthy work environment.)
- Blackboard is not a public internet venue. 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).
- Attendance is not mandatory since you have many ways to access the lecture and course materials. However, if it is evident that the student is not attending nor keeping up with the materials, this may be used in the “Instructor Assessment” portion of the grade.
- If you are in attendance, be in the moment. Working on something else, texting, using your phone or laptop, disrupting class, or snoring will not be allowed… you will be asked to leave.
- The class is not dismissed until I dismiss it. If you need to leave early, please inform the professor prior to the start of class (provide the professor professional courtesy).
- If you need to use the facilities, please leave, and return as discreetly as possible.
- Assignments must be completed by the deadline indicated.
- You are responsible for doing the homework, regardless of the platform assigned (i.e. ZyBooks interactive completion; written, scanned and uploaded to BB, etc.). Additionally, you are responsible for completing assignments (and uploading them, if applicable), even though it may or may not be completely graded: it is possible to get full credit for completing it, or perhaps the complete grade will be based on only some of the problems.
- You may collaborate on the homework (note that collaboration and studying together is not the same as copying or any form of academic dishonesty).
- You may **not** collaborate on quizzes or exams. This is a form of academic dishonesty and will be reported to the Office of Student Conduct and Conflict Resolution.
- Exams will be online, and might be scheduled for the classroom, or to take at a location of your choice. If they are scheduled for in-class, you will be asked to provide your official UTEP ID prior to admittance into the exam venue. (NOTE: without proper ID, you will not be allowed to take the exam.)
COURSE COMMUNICATION and LEARNING ENVIRONMENT

COPYRIGHT STATEMENT FOR COURSE MATERIALS: All materials used in this course (including but not limited to assignments, exams, quizzes, handouts, 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.

MAKE-UP WORK POLICY: Make-up work will be given only in the case of a documented emergency, so please contact the professor immediately. Note that make-up work may be in a different format than the original work. If you miss an assignment due to an unexcused absence, you will receive a zero. It is therefore important to reach out—in advance if at all possible—and explain why you missed a given course requirement. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

COURSE DROP POLICY: According to UTEP Curriculum and Classroom Policies, “When, in the judgment of the instructor, a student has been inactive to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class.” If you have a large number of missed assignments, you may be dropped from the course. The grade that you will receive will be a “W” before the course drop deadline and a grade of “F” after the course drop deadline. If you feel that you are unable to complete the course successfully and you need to drop this class, please contact the Registrar’s Office to initiate the drop process before the Drop Deadline. If you cannot complete this course for whatever reason, please contact me. Disappearing without formally dropping a course or withdrawing from the University, will result in a zero on each assessment activity you miss thereafter and will ultimately result in you receiving a grade of “F” at the end of the semester. NOTE: we are required to report *when* you stopped attending or participating in assigning an “F” …. This could impact your financial aid.

INCOMPLETE GRADE POLICY: A grade of “Incomplete” (i.e. an “I” grade) may be requested only in exceptional circumstances. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with associate deadlines. While an “I” has no GPA value and will not impact (NOTE: and “I” grade becomes an “F” either after the specified deadline, or after one year after the end of the semester, whichever comes first.)

ELECTRONIC DEVICES POLICY: Use an internet connected device to access course resources, participate in assessment activities (such as submitting homework, quizzes, etc.) using the appropriate tools within Blackboard.

TECHNICAL DIFFICULTIES POLICY: It is strongly suggested that you submit your work with plenty of time to spare in case you have a technical issue with the course website, network, Wi-Fi, and/or your computer. Also, you should save a copy of all submitted/uploaded work. If you are experiencing difficulties, please contact UTEP’s technical support and email if necessary.
**Technical Support:** Please follow the link for Blackboard Student Orientation to review/learn how to submit assignments, review feedback/grades, etc. If you need technical support with Blackboard, please contact UTEP’s Help Desk at (915)747-4357 (HELP) or helpdesk@utep.edu. For help with equipment, internet access, and tech support please visit https://www.utep.edu/technologiesupport/

**SCHOLASTIC INTEGRITY/ACADEMIC HONESTY:** Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. Any form of academic dishonesty will not be tolerated. “Plagiarism” is the unattributed use of someone else’s work: a classmate’s, a website’s, even a teacher from another course. In accordance with University regulations, scholastic dishonesty on a given assignment will be subject to disciplinary action and will be referred to the Office of Student Conduct and Conflict Resolution (OSCCR). Dishonesty/cheating/plagiarizing may result in a zero on the assignment, an “F” in the course, or even suspension or dismissal from the university. If you need assistance with your assignments, please consult authorized sources of help. For more information on Scholastic Dishonesty and/or Plagiarism, consult the Handbook of Operating Procedures: Student Affairs, which is available in the Office of Student Life or visit HoOP: Student Affairs [https://www.utep.edu/hoop/section-2/](https://www.utep.edu/hoop/section-2/), Chapter 1: Student Conduct and Discipline [https://www.utep.edu/hoop/section-2/student-conduct-and-discipline.html](https://www.utep.edu/hoop/section-2/student-conduct-and-discipline.html).

**ACCOMMODATIONS POLICY** – Center for Accommodations and Support Services (CASS): The University is committed to providing reasonable accommodations and auxiliary services. Students requiring unique accommodations must contact and register with the CASS office and make sure to talk to the instructor at the beginning of the semester to discuss necessary arrangements. The CASS Office may be contacted at 747-5148, cass@utep.edu or go to Room 106 Union East Building.

**ILLNESS and COVID Precautions**

Please stay at home if you have symptoms of COVID-19, or any communicable illness. You will not be downgraded or judged negatively if you do not come to class. If you are feeling unwell and unable to complete homework or exam deadlines, please let me know as soon as possible, so that we can work on appropriate accommodations.
WHAT YOU NEED TO DO TO BE SUCCESSFUL IN THIS COURSE

**Prepare in advance:** In order to be successful, each student must be proactive in using all the resources (physical—or PDF—textbook, electronic book, and reference material) related to the current and upcoming topics, understand your homework, and complete any other assignment BEFORE the deadline.

**Tips for Success in this class:**

1. Take notes. Yes, a copy of the PP slides from lecture will be provided, but they pale in comparison to the learning that occurs when you take your own notes and explain things in your own words, or make (and write) observations in the moment that can lead to understanding upon rereading. Be organized, keep your notes in order, stay on schedule, and prioritize your time.
2. Visit the class BlackBoard shell and read UTEP e-mail to avoid missing important announcements or deadlines.
3. Read ahead from both the electronic and physical book by following the topic sequence as denoted in the ‘Course Schedule.’ As you read, take notes and make summaries in your own handwriting (research shows handwriting has a better effect on your memory). All of this will help you study for assessment activities.
4. Be proactive and meet all the deadlines. Try to finish your assignments early (this will help in case you get stuck or something unexpected comes up). Make sure to understand how to solve these assignments as they are there to help you prepare!
5. Visit the instructor during office hours if you need assistance, or use e-mail or TEAMS to set up an appointment. Remember you can also seek assistance from the Lab TAs.
6. Start your success by not falling behind! You need to be proactive about meeting your educational goals.
7. Remember that the grade assigned at the end of the semester is the grade you earn through your work. It is up to you to monitor your own performance and adjust your efforts in a timely manner if you find that you are falling behind in your work, or that your grades are not reflecting your true potential.