University of Texas at El Paso
ECE 4353: Digital Systems Design II
EE 5390: Special Topics: Digital Systems Design I
Spring 2024

Lecture: Tuesdays/Thursdays 10:30AM-11:50AM (CCSB 1.0204) **CRN: 27269, 27294**

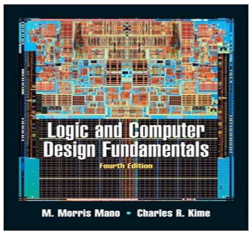
Instructor Dr. Miroslava Barúa **E-mail** mbarua@utep.edu

Office Engineering Building **A-314** or virtually via **Microsoft Teams** (*click on link posted on Blackboard*)

Office Hours Tuesdays & Thursdays 12:30PM-2:00PM or by appointment

REQUIRED COURSE MATERIALS

1. **Textbook: "*Logic and Computer Design Fundamentals*"**
   Authors: M. Morris Mano and Charles R. Kime.
   Edition: 4th Edition
   Publisher: Pearson
   ISBN-10: 013198926X **ISBN-13:** 978-0131989269



2. **UTEP Miner Gold Card–** All students must have their photo on their UTEP ID. **For information visit https://www.utep.edu/vpba/miner-gold-card/**

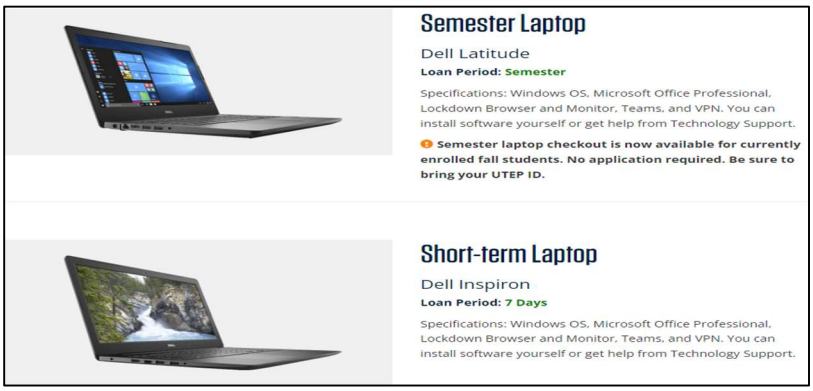
3. **Technology Requirements**

- **Access to our Blackboard (BB) shell**- Course content is delivered via Blackboard Learning Management System (LMS). Here you will find course resources, announcements, link to virtual office, submit/participate in assessment activities using integrated tools such as **Gradescope**, **iClicker**. Students must have a computer/mobile device and internet connectivity.
- Use of ***@miners* e-mail account** – all official class communication should be using this domain.
- **Create PDF files** -- be able to create PDF files to upload assignments *{by converting directly from Word to PDF, by using a scanner scanning App}*
- **HyFlex Course:** A course that integrates face-to-face (F2F) classes with an online learning experience. HyFlex courses differ from hybrid and blended courses in that students are given the **choice** to attend classes **F2F or online via video conferencing software such as Zoom or MS Teams** during the assigned course time. Faculty teach every class session F2F. Synchronous sessions may be recorded and housed in Blackboard.

	
Face-to-Face (F2F) Live	**Online Livestream (OL)**
Students will attend class F2F in your classroom. Class sessions will be livestreamed and recorded.	Students will be watching your class livestreamed online while you're teaching.

  - **During class time, online learners are expected to have the same active participation as students attending F2F. Make sure to use a device capable of accessing all the course tools and enabled with a working microphone for verbal participation.**

- **If needed, you can check out equipment from Library Room 300 --**Stop by early in the semester to learn about their options according to your needs. **Visit this link for more details:** https://www.utep.edu/technologysupport/TSCenter/tsc_eqcheckout.html



- You must have access to all these tools for content delivery, assignment submission, and to participate in assessment activities. ***Detailed instructions for these tools can be found on the "How to…{instructions}" folder located on our course Blackboard shell.***

COURSE DESCRIPTION: What this class is about

Course Description: In this course you will learn about design techniques for complex digital systems, with emphasis on computer hardware design and computer- aided techniques, including hardware description languages and hardware simulation packages. Algorithmic State Machine design is stressed for small systems. Design methodologies of large digital systems with standard SSI, MSI and LSI. Emphasis on problem definition, design, and verification.

Prerequisite: ECE 2304 and ECE2104 with a grade of "C" or better. Prerequisite by Topic: (1) combinational and sequential digital design techniques (2) basic microprocessor architecture (3) assembly language programming (4) High-Level language programming.

Corequisite: ECE 4153 must be taken concurrently with ECE 4353.

Students completing ECE 4353/ EE5390 will be able to:

1. Apply different design methods for digital circuitry from problem statement to physical implementation
2. Use good design techniques, especially top-down design such as the ASM method.
3. Recognize and apply typical hardware constructs for processing units.
4. Recognize and apply typical hardware constructs for control units: hardwired and microprogrammed.
5. Write microcode using standard microcoding techniques
6. Use computer aided tools to simulate and verify designs
7. Find information on specific chips and how to obtain application notes

Topics Covered:

1. Review of combinational and sequential digital design techniques, HDL representation, memory components and PLDs
2. Algorithmic State Machine (ASM) design procedure
3. Datapath (CPU) operations and design; design of a control word
4. Sequencing and Control: hardwired and microprogrammed
5. Instruction set architecture
6. I/O, communication and memory systems (if time allows)

Grading & Course Assignments – How grade is calculated

There will be no curving of grades in this course.

Grading will be based on the standard scale:

90% >……**A**

80% -89%……**B**

70% -79%……**C**

60% -69%……**D**

Below 59%……**F**

***Graduate students - Please see note at the end of this section for additional work and requirements.**

Course Grade Distribution	
Exam #1	**20%**
Exam #2	**20%**
Exam #3	**20%**
***Assignments**	**18%**
Class Participation/Quizzes	**17%**
Instructor Assessment	**5%**
TOTAL	**100%**

Your final grade is earned by your active participation and performance in the following components:

- **Exams**: all students will take the test in the same learning environment **(in-person: in the classroom at the assigned class time)**. There will be three partial exams (1, 2 and 3, all equally weighted) taken 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 on a timely manner.**

- **No exam score will be dropped;** however, ***if*** there is an **extenuating circumstance** that can cause a student to **miss one** examination, such student must **notify instructor immediately (ideally before the exam takes place), and:**
    - ***If*** the circumstance warrants an excused absence approved by the instructor, the student will need to provide: (1) proof of illness or emergency, (2)a written and signed statement describing the reasons for missing an exam, and (3) a petition in writing to take a ***comprehensive*** exam (*all chapters in the semester*) at the end of the semester to replace that **one** missed exam. All the submitted documents will be kept under the student record. Note: the student **must have taken the other two exams to qualify for this replacement**. Be aware that inherently a comprehensive exam will be more difficult.
    - **If you missed and exam without having an approved excuse, it will be graded with a "zero" in that exam** and the student will **not** qualify to take a comprehensive exam.

- **Assignments:** 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. 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 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 assignment **must be submitted by the deadline and must have student's *Name, course name, assignment number and Due date.*** Assignments will be submitted thru **Gradescope**. **Problems should be presented in the same order as listed on the assignment instructions and final answers clearly marked with a box around it.**
    - **Reading assignments** → Read all the assigned sections from the **textbook** and **reference material**. Refer to '***Course Schedule'*** for topic sequence.
    - **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 will come from quizzes so make sure to be well prepared for them on a timely manner. Quizzes will assess your completion and understanding of all homework assignments (based on problem sets) 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 quiz will be given;** however, your lowest quiz score will be dropped
    - Polls and Quizzes will be administered **during class time** and using **iClicker or Gradescope**, so make sure you know how to use this tool (refer to the '***How to…{instructions}'*** folder) 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 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, they **cannot be made up** after their due date has passed. If you have an excessive number of missed items, you may be dropped from the course.
- **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.

- **Graduate Students:** If you are a **graduate student** taking this course 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 allotted from the *Assignments* component)
  - Successfully complete a **final exam**, prepared especially for graduate students; and
  - **Maintain an 80% average** (minimum) on homework, design work and exams

  Failure to comply will warrant a failing grade in the course

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

COURSE COMMUNICATION and LEARNING ENVIRONMENT

Office Hours: You are highly encouraged to interact and talk one-on-one with me about your questions and comments related to the course. You can either stop by my physical office located at room **A-314 or** connect via the virtual office conveniently accessible from anywhere using **Microsoft Teams** (all you need to do is click on the access link located on our home page on Blackboard). **I will be available during the posted times.** Please send me an email if you have schedule conflict and need to **make an appointment** to meet with me outside the posted office hours.

E-mail Communication: Send all your class related e-mails to **mbarua@utep.edu** . Due to high volume of emails received, please be patient and be certain that I will make every attempt to respond to your email within 24-48 hours of receipt (usually much sooner but 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- my response may not get back to you on time). **Make sure** the message's subject description has prefix "**ECE 4353: " or "ECE5390:"** followed by the rest of the message's subject (Example: "*ECE 4353: Question about homework*"). In 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**. Treat e-mail correspondence as a professional exchange of information.

- **Announcements**: Check the Blackboard announcements 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 (network 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 will be tolerated.
  - 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).

COURSE AND UNIVERSITY POLICIES:

COPYRIGHT STATEMENT FOR COURSE MATERIALS: All materials used in this course (such 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. Note that make-up work may be in a different format than the original work, may require more intensive preparation, and may be graded with penalty points. If you miss an assignment and the reason is not considered excusable, you will receive a zero. It is therefore important to reach out to me—in advance if at all possible—and explain with proper documentation 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 absent 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 on March 28th**. 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.

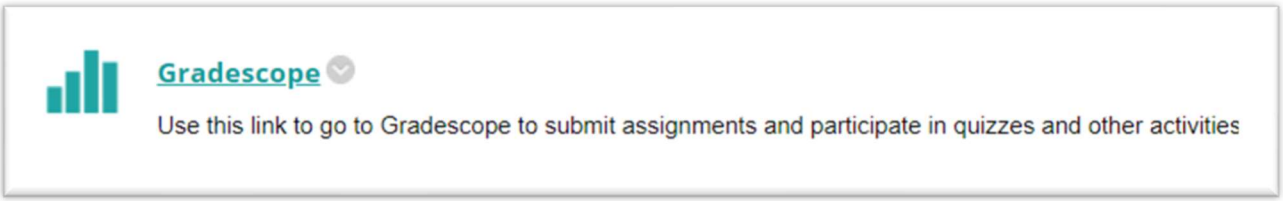
INCOMPLETE GRADE POLICY: Incomplete grades may be requested only in exceptional circumstances after you have completed at **least half of the course requirements**. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

ELECTRONIC DEVICES POLICY: Must 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.

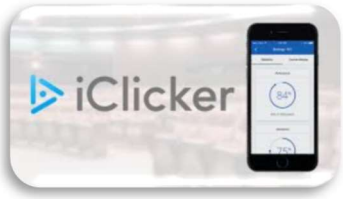
TECHNICAL DIFFICULTIES POLICY: I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue with the course website, network, and/or your computer. I also suggest you save a copy of all submitted/uploaded work. If you are experiencing difficulties please contact UTEP's technical support and email if necessary.

> **Technical Support:** Please follow this link for Blackboard Student Orientation to review/learn how to post assignments, participate in discussions, take a test on Blackboard, review feedback/grades, etc. If you need technical support with Blackboard, please contact UTEP's Help Desk at (915)747-4357 (HELP), helpdesk@utep.edu. For help with equipment, internet access and tech support please visit https://www.utep.edu/technologysupport/learningremotely.html

GRADESCOPE: For assessment activities, you will **need to submit through Gradescope**. This tool will be accessible by clicking on the link located on our Blackboard home page (tool link is illustrated below).



iClicker : This Classroom Response System (CRS) technology enables instructor to ask questions, gather student responses, display those responses in real-time. **Students use their own mobile device (laptop, tablet, or smartphone) to submit their responses.** Visit this link to learn more: https://www.utep.edu/technologysupport/ServiceCatalog/INST_ClassResponseSystem.html



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 – coming from a classmate's, a website's, tool, even a teacher's 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 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 Conduct and Discipline.

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.

COVID-19 Precautions

Please stay at home if you have been diagnosed with COVID-19, and send me an **email as soon as possible**. 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/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. For updated information about reporting visit: https://www.utep.edu/ehs/covid/

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 (textbook 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. Be **organized**, keep your notes in order, make sure to meet all weekly expectations to receive credit and to avoid falling behind.
2. Visit the class Blackboard shell and read UTEP e-mail to avoid missing important announcements or deadlines. It's your responsibility to **stay on schedule and prioritize your time**.
3. **Read ahead** from 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 something unexpected comes up). Make sure to understand how to solve these assignments as they are there to help you prepare and you may have a quiz about this content.
5. Visit instructor during office hours if you need assistance, or use e-mail to set up an appointment. Remember to also seek assistance from our Lab TAs.
6. Start your success by not falling behind! You need to **be proactive** about meeting your education goals.
7. Remember that the grade you get is the grade you earn through your work**. It is up to you to monitor your own performance and adjust your efforts on a timely manner** if you find that you are falling behind on your grades.

UTEP Student Resources: Where to go for assistance

UTEP provides a variety of student services and support:

Technology Resources

- UTEP **Help Desk**: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone at (915)747-4357 (HELP), email to helpdesk@utep.edu , go to their website, chat, or by visiting their offices.

Academic Resources

- **UTEP Library:** Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- **University Writing Center (UWC)**: Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.

- **Math Tutoring Center (MaRCS)**: Ask a tutor for help and explore other available math resources.

Individual Resources

- **Military Student Success Center:** Assists personnel in any branch of service to reach their educational goals.
- **Center for Accommodations and Support Services**: Assists students with ADA-related accommodations for coursework, housing, and internships.
- **Counseling and Psychological Services:** Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

COVID-19 Resources

- UTEP COVID-19 website: **https://www.utep.edu/ehs/covid/**
- UTEP COVID-19 Testing: **https://www.utep.edu/chs/covid-testing/index.html**
- UTEP Counseling and Psychological Services: 747-5302 or **CAPS@utep.edu**
- UTEP Student Health and Wellness Center**: https://www.utep.edu/chs/shc/**
- El Paso Strong statistics website: **http://epstrong.org/**