

SYLLABUS

ECE-4242/5242 Advanced Digital Design Methodology

UCCS, Fall 2023

Course Description: Focuses on modern digital design practice using computer-based design tools and then considers key steps in a modern design flow, with particular attention to the use of behavioral models in hardware description languages as a stepping stone to combinational and sequential logic synthesis. The Verilog language will be presented, along with ancillary topics of functional verification, test-bench generation, timing analysis, fault simulation, and design for testability. Design examples will include microcontrollers, finite state machines for datapath control, serial and parallel communication protocol controllers, and typical architectures of synchronous computational units.

Instructor:	Dr. Darshika G. Perera
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	Office : ENGR-222
	Website : http://ece.uccs.edu/~dperera/
Class Time:	Thursday 8.00AM – 10.40AM
Class Rooms:	Engineering – ENGR-101
Office Hours:	Mondays 11.00AM – 12.00PM & Thursdays 12.00PM – 1.00PM
References:	1) Ciletti, M D. <i>Advanced Digital Design with the Verilog Hardware Description Language</i> . Upper Saddle River, NJ: Prentice-Hall, 2003 (1 st edition) or 2010 (2 nd edition) 2) IEEE, <i>IEEE Standard for Verilog Hardware Description Language</i> . New York: IEEE, 2005 (a.k.a. Verilog Language Reference Manual, or LRM)
Prerequisites:	ECE 2411 or consent of the instructor. Meets with ECE 5242.
Grading	Homework: 50% * Mid Term & Final Exams: 50% (mandatory to pass the course)**
Teaching Assistant	Mr. Shafayat Anik, email: sanik@uccs.edu

** Final exam (for both undergraduate/graduate students) are mandatory to pass the course. The students will be given an “incomplete grade” if any of these course requirements are not fulfilled.

Note: Check the Canvas regularly for announcements, updates, and new material.

*** Homework Policy:**

1. Any HW turned in after 8.00AM on Thursdays will be penalized 15%.
2. Any HW turned in after 11.00AM on Thursdays will not be accepted.
3. The only acceptable method to turn in late homework is to email it to the TA, and cc.. to me.

4. **You must turn in a hardcopy.** If you cannot attend the class, homework can be e-mailed in a single .doc or .pdf format ONLY. Don't send images. Please name the file 4242_<Last Name>_<HW name> and send it to TA and cc to me dperera@uccs.edu so I know you turned it in on time. Also, put 4242_<Last Name>_<HW name> in the subject line of the email.

Class Handouts: All class handouts, like slides and homework will be posted on the Canvas. Print them out if you want a hard copy.

Topics Covered: Review of combinational and sequential logic design; Modeling and verification with hardware description languages; Introduction to synthesis with HDLs; Programmable logic devices; State machines, datapath controllers, RISC CPU; Timing analysis; Fault simulation and testing.

Total marks are calculated as follows: Will be updated soon!!

The grades are as follows:

A	=94-100
A-	=90-93
B+	=87-89
B	=84-86
B-	=80-83
C+	=77-79
C	=74-76
C-	=70-73
D+	=67-69
D	=64-66
D-	=60-63
F	=below 60

Course Schedule

Note: This is a tentative schedule, subject to change.

Please do not make travel arrangements during the mid-term, and also during the final exam period.

Week	Date	Planned Activities	Homework Due
1	08/24	Lecture 1: Chapter 1 and Chapter 2 Post: homework 1	
2	08/31	Lecture 2: Chapter 3 Post: homework 2	Homework 1
3	09/07	Lecture 3: Chapter 4 Other handouts: ModelSim Tutorial Post: homework 3	Homework 2

3	09/14	Lecture 4: Chapter 5 Part A Post: homework 4	Homework 3
4	09/21	Lecture 5: Chapter 5 Part B Post: homework 5	Homework 4
5	09/28	Lecture 6: Chapter 5 Part C Post: homework 6	Homework 5
6	10/05	Lecture 7: Chapter 6 Part A & Mid-Term Review Other handouts : OSU Cell Library Area Post: homework 7	Homework 6
7	10/12	Mid Term Exam	
8	10/19	Lecture 8: Chapter 6 Part B Other handouts : Unix Cheat Sheet and Synthesis Tutorial Post: homework 8	Homework 7
9	10/26	Lecture 9: Chapter 6 Part C Other handouts : Netlist Simulation Post: homework 9	Homework 8
10	11/02	Lecture 10: Chapter 7 Other handouts: RISC zip_folder Post: homework 10	Homework 9
11	11/09	Lecture 11: Chapter 7 and 8 Other handouts: FPGA Diagrams, Cypress SRAM datasheet Post: homework 11	Homework 10
12	11/16	Lecture 12: Chapter 8 and 11 Post: homework 12	Homework 11
13	11/23	Thanks giving holidays (No classes)	
14	11/30	Lecture 13: Chapter 11	Homework 12
15	12/07	Final Exam Review	
16	12/14	Final Exam	

Recording Policy:

Students are prohibited from making audio or video recording of any class activity conducted in person or online unless the student has provided the instructor with a Faculty Accommodation Letter from Disability Services. In such cases, the Faculty Accommodation Letter must be

presented to the instructor prior to any recording done and recording should be reserved for that individual's educational use only. Students who are permitted to record are prohibited from distributing recordings without consent. Distribution without consent could be forwarded to the Dean of Students for consideration under the student code of conduct. Recording class activity without consent is a violation of instructor and student right to privacy, copyright, and intellectual property.

Academic Dishonesty:

<http://www.uccs.edu/~dos/studentconduct/academicdishonesty.html> defines plagiarism and cheating as:

Plagiarism is the use of distinctive ideas or words belonging to another person, without adequately acknowledging that person's contribution. Regardless of the means of appropriation, incorporating another's work into one's own requires adequate identification and acknowledgement, unless the material used is considered common knowledge. Plagiarism is doubly unethical because it deprives the true author of the rightful credit and gives that credit to someone who has not earned it. When the source is not noted, the following would constitute plagiarism:

- Word-for-word copying;
- The mosaic (to intersperse a few words of one's own here and there while, in essence, copying another's work);
- The paraphrase (the rewriting of another's work, but still using the same fundamental idea or theory);
- Fabrication (inventing or counterfeiting sources);
- Ghost-written material (submitting another's effort as one's own)

Cheating involves intentionally possessing, communicating, using (or attempting to use) unauthorized (by the instructor) materials, information, notes, study aids, or other devices, in any academic exercise, or communication with any other person during such an exercise. Examples:

- Copying from another's paper or receiving unauthorized assistance from another during an academic exercise or in the submission of academic material.
- Using a calculator when the use has been specifically disallowed.
- Collaborating with another student or students during an academic exercise without the consent of the instructor.
- **Important – Students are not allowed to post: their own solutions online; instructor's solutions online; or other students solutions online.**

Bottom Line: You are not authorized to use another student's solutions to the homework, labs, or projects to create your solutions. You may discuss solutions but the final work must be your own. Academic Dishonesty will result in an F in the course.

Military Policy:

If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact your UCCS Course Instructor no later than the first week of class to discuss the class attendance policy. You are also strongly

encouraged to schedule a one-on-one conversation with the Instructor so that special accommodations can be made.

Disability Services:

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact and register with the Disability Services Office, and provide them with documentation of your disability, so they can determine what accommodations are appropriate for your situation. To avoid any delay in the receipt of accommodations, you should contact the Disability Services Office as soon as possible. Please note that accommodations are not retroactive, and that disability accommodations cannot be provided until an accommodation letter has been given to Disability Services. Please contact Disability Services for more information about receiving accommodations at Main Hall room 105, 719-255-3354 or dservice@uccs.edu.

Testing Center:

The University Testing Center is available to all students; however, students with certified disabilities get first priority. The Testing Center requires 24-hrs advanced notice to schedule a testing time. Students are not always guaranteed the testing day and time of their choice and students without certified disabilities pay a testing fee.

Use of Laboratory Equipment:

Intentional misuse of laboratory equipment will not be tolerated and may result in criminal charges or other discipline.

During Fall 2021: (following requirements might have changed)

Mandatory Requirements due to COVID-19:

All students are expected to wear face coverings while inside all UCCS buildings/facilities. Guidance and exceptions to wearing a face covering can be read in the full executive order (<https://vcaf.uccs.edu/sites/g/files/kjihxj1631/files/inline-files/COVID-19%20-%20Exec%20Directive%20APPROVED%20%288.17.2021%29.pdf>). Students may be asked to leave the class if they are not wearing a face covering and additional disciplinary action may result in accordance with the Student Code of Conduct.

Before Fall 2021: (following requirements might have changed)

Additional Details/Requirements Due to COVID-19:

Classroom and Campus Etiquette:

- All students must take a self-health assessment regarding COVID 19 and symptoms (EVERY DAY) before coming to campus. You should carry evidence you have taken the quiz with you on campus.
- As you enter class, I may ask you to show me that you answered the questions on the self-health assessment as you enter the room.
- You are required to wear a face covering which covers your nose and mouth while on campus indoors at all times. This includes in the classroom. Wearing a face shield only is not sufficient for being in-class with faculty. Faculty may remove their face covering if at least

12 feet from students, but students are required to wear a face covering at all times. Students and faculty may wear both a face covering and a face shield when on campus.

- Face masks can't have holes in them. More information can be found here: [https://covid19.uccs.edu/sites/g/files/kjihxj1366/files/inline-files/On-Campus_Face_Covering_Requirements_and_Compliance\(2\).pdf](https://covid19.uccs.edu/sites/g/files/kjihxj1366/files/inline-files/On-Campus_Face_Covering_Requirements_and_Compliance(2).pdf)
- Students who do not wear a face covering when entering buildings and classrooms will be asked to leave.
- You are required to stay six feet away from your classmates, and staff and faculty at all times.
- **Faculty have the right to cancel a class** if there are students who do not observe 1) Answering the questions on the safety quiz, 2) wearing a face mask over their nose and mouth, 3) keeping proper social distance, and students who are visibly sick

Group Work in the Classroom

- Periodically you will be asked to engage in small group discussion in the classroom. Even in small groups, we must continue to wear face coverings and maintain social distance guidelines. In class, using Microsoft Teams and Canvas Collaboration tools including chat, whiteboard, and shared documents can enhance small group interaction while maintaining public health guidelines.

What should I do if I am sick?

- The student health center on campus can give you a rapid COVID 19 test if you have the symptoms of COVID 19. It only takes 15 minutes to get your results!
- If you're sick, even with a cold, please stay home to avoid spreading your illness.
- Isolate yourself from others if you are sick and seek medical care

Attendance and Missing quizzes, exams and activities due to illness

- Attendance will be taken at all in-person classes. This is in order to do contact tracing if needed.
- You may be excused from one class activity (quiz or exam, etc.) during the semester if ill. Please don't come to campus sick, even if it's not with COVID 19. Please let me know the day of the quiz or exam (or faculty can decide what's appropriate) before it starts, and I will average the scores of your other exams and quizzes and replace that score.
- If you have a long-term illness, we will consider that on a case-by-case basis.