CIS*3120: Digital Systems I
Computer Science, Winter 2022

Credit Hours: 3 lecture + 2 lab
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Course Web Page: Available through CourseLink: https://courselink.uoguelph.ca

In this document, all text that appears in red refers to policies put in place to deal specifically with the University of Guelph's plan to start the Winter 2022 semester online January 10 to January 24.

Disclaimer: Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via Courselink and/or class email. This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

General Description
The objectives of this course are to develop skills in the design and analysis of digital logic components and circuits, to make students thoroughly familiar with the basics of gate-level circuit design starting from single gates and building up to complex systems, and to provide exposure to circuit design using a schematic entry based computer-aided design tool.

Requirements
This course assumes no prior background in digital-logic design, except for a basic understanding of Boolean algebra.

Course Outline
Each bullet corresponds to *roughly* to 1-3 weeks of the semester.
- Overview of logic design
- Logic gates, DeMorgan-Equivalent Symbols, Positive and Negative Logic
- Truth Tables, SoP and PoS forms, K-maps, Hazards and Glitches, Q-M simplification
- Combinational Circuits: Adder, Subtractor, Ripple-Carry, Carry Lookahead, Generalized ALU Design, Multiplexers, De-multiplexers, Decoders, Encoders
- Sequential Circuits: Latches, Clocks, Flip-Flops, Registers
- Moore Machines, Mealy Machines, State-Minimization
- Semiconductor Memories: DRAM and SRAM
- Programmable Logic Devices: PROMs, PALs, PLAs, FPGAs

Textbook

- Mano. M. and M. Ciletti (2015-2018). *Digital Design*, Pearson
- PDF Lab Exercises are provided via the course website

Lectures

Course delivery is face-to-face. There are *three* lectures per week: MWF 2:30pm to 3:20pm in CRSC 116.

In accordance with the University of Guelph's plans for the start of the Winter 2022 semester, lectures will be presented online between January 10 and January 24. These lectures will be presented in a synchronous (i.e., not recorded) format, and will be accessible through the Zoom interface available in CourseLink during regular lecture times. Please check the Calendar in CourseLink for Zoom links.

Teaching Assistants

There are two Teaching Assistants (TAs) assigned to this course:

- Abbas Yazdinejad
- Jason Kemp

Abbas is responsible for running the face-to-face labs and for marking all laboratory excercies (see below). Similarly, Jason is responsible for marking all homework assignments (see below). Both TAs will participate in the grading of the tests. Therefore, please make sure that you contact the *correct* TA if you have any issues regarding grades. Contact information for each teaching assistant is posted on CourseLink.

Course Evaluation

Your final grade will be determined as follows:

Weight	Description	Notes
22%	11 weekly Homework Problems See semester schedule at end of this document for dates.	Due at the beginning of class.
40%	2 tests, each with weight 20% See semester schedule at end of this document for dates.	During regular class hours. Weight cannot be transferred to other grade items.
38%	Labs 1-10 each have a weight of 3%. Lab 11 has a weight of 8%. See semester schedule at end of this document for dates.	Labs are due at the end of the scheduled 2-hour lab section.
Total Grade = 22% (Homework) + 20% (Test 1) + 20% (Test 2) + 38% (Labs)		

All requests for re-grades must be made by email to the teaching assistant responsible for marking your homework, lab, or test within one week of the grade being posted on CourseLink. It is your responsibility to be vigilant and check your grades regularly. Late requests will not be considered.

Homework

Weekly homework problems are used to reinforce material learned from attending and participating in lectures, and from the prescribed textbook readings. Homework problems are assigned each Monday, and are due at the beginning of class the following Monday. Most, if not all, problem sets require at most 1 hour to complete, and you are given 168 hours each week to complete the problems. Therefore, please have your homework ready to submit on time.

In accordance with the University of Guelph's plans for online course delievery between January 10 and 24, each of the first two homework assignments are to be submitted electronically to a Dropbox using CourseLink. See the instructions posted on CourseLink and on the Cover Sheet for the homework.

Labs

Labs are face-to-face. Each week you will design, simulate, and test one (or more) digital circuits using *LogicWorks* – a Windows based (schematic entry) software package. (This software is accessible through the School of Computer Science Windows' servers. Please visit the School's wiki (wiki.socs.uoguelph.ca) if you require technical help connecting to the sever. If you require further help, please send a ticket to help@socs.uoguelph.ca.) Prior to attending your scheduled lab section, you are expected to have started the lab with the expectation of completing the lab during the face-to-face lab. During the lab, any outstanding questions (or issues) can be directed to the lab instructor for clarification (or help). Each lab is marked by the TA *during* the regularly scheduled lab (not online afterwards). Therefore, come sufficiently prepared to finish your lab on time. You must attend your assigned lab section (and cannot move between lab sections).

In accordance with the University of Guelph's plans for online course delievery between January 10 and 24, the first lab will be held online using Zoom, and will be submitted electronically to a Dropbox using CourseLink. See the instructions posted on CourseLink.

Tests

Both tests in this course will be written during normal class hours, and will be closed book.

Should the University of Guelph's plans for the Winter 2022 semester change, requiring one or both tests to be written online, you will be expected to be able to print off the exam, complete the questions in pen, and submit your answers in a single PDF document, all during regular class hours. If you are not able, or willing, to do this, please take this course at a later date when it will be possible to have a paper test written face-to-face. Also, for the sake of academic integrity, you will be expected to turn your camera on while writing the test. If you are not able, or willing, to do this, please take this course at a later date when it will be possible to write exams in a fully face-to-face environment. The weight associated with failing to write a test cannot be added to other grade items.

Electronic Mail

As per university regulations, all students are required to check their username.uoguelph.ca e-mail account regularly: e-mail is the official route of communication between the University and its students, and will be relied on heavily in this course.

Considerations and Constraints for Online Learning

This is a face-to-face course. However, in accordance with the University of Guelph's plans for online course delievery between January 10 and 24, the following considerations apply:

- Presentations which are made in relation to course work, including lectures, *cannot* be recorded, downloaded or copied without the permission of the presenter, whether the instructor, a classmate, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

- Online activities such as advising times, question and answer sessions, and interactive lectures *may* be recorded by the instructor or TAs and posted to Courselink. By taking this course you are agreeing that your participation in these activities can be used in this manner. If you do not wish to have your image or voice recorded as part of these activities then either do not take this course or do not ask verbal questions during these activities.

- A reliable internet connection that is sufficient for online learning is necessary for this course. If you do not have a sufficiently fast and reliable internet connection, you may not be able to view lectures or other course material. It may also not be possible to attend labs or online advising with teaching assistants or the instructor. By taking this course, you are agreeing that you have access to all of the necessary resources to fully participate in the activites of this course.

- This course is offered in the Eastern Standard Time (EST) zone. While taking this course you will be required to attend online/face-to-face activities such as lectures, advising or labs between 9:30am and 4:20pm EST.

- Keep copies of labs and homework problems that you have submitted. You may be asked to resubmit these at a later time.

- Do not download, copy, or upload any course material (Intellectual Property) to other sites on the internet, including Chegg and CourseHero, or share course material in any other way. To do so will be treated as a violation.

Course Policy and Procedures

Should you have any questions regarding course policy or procedures direct your query to the instructor (and not the teaching assistant). Should any inconsistency arise between instructions provided by the instructor and the teaching assistant, instructions provided by the former must be adhered to.

A Word of Caution

Needless to say, plagiarism in any form must be dealt with severely. *There is no group work in this course.* Therefore, when answering questions do it yourself. Be original. All submitted items will be checked for plagiarism, as well as for uploads to websites, like Chegg, in search of answers. All cases of academic misconduct are handled by the Dean, in conjunction with the Department Chair. Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of homework or labs does not excuse students from responsibility for verifying the academic integrity of their work before submitting it.

Successive infractions of misconduct affirmed by this process could have consequences as serious as expulsion from the University. *(It is your responsibility to acquaint yourself with the definitions and ramifications of academic misconduct as described in the university's undergraduate Calendar.)* The risks are sufficiently great that they are not worth taking. If you are having trouble, please see the teaching assistant or the instructor for help. Moreover, if you are not sure whether a potential action is appropriate, check either with the instructor or Greg Klotz or Sarah Brennan – the undergraduate faculty advisors for the School of Computer Science.

Schedule of Dates

The table below shows the (due) dates for all homework problems (HW) and lab (LAB) exercises, along with the dates of Test 1 (T1) and Test 2 (T2). Assignments are due at the beginning of class. Labs are due before the end of the lab session. Tests are written in class and due at the end of class.

Graded Item	Homework	Tuesday Lab	Friday Lab	Tests
HW1/LAB1	Jan. 17	Jan. 18	Jan. 21	
HW2/LAB2	Jan. 24	Jan. 25	Jan. 28	
HW3/LAB3	Jan. 31	Feb. 1	Feb. 4	
HW4/LAB4	Feb. 7	Feb. 8	Feb. 11	
HW5/LAB5/T1	Feb. 14	Feb. 15	Feb. 18	Feb. 18
HW6/LAB6	Feb. 28	Mar. 1	Mar. 4	
HW7/LAB7	Mar. 7	Mar. 8	Mar. 11	
HW8/LAB8	Mar. 14	Mar. 15	Mar. 18	
HW9/LAB9/T2	Mar. 21	Mar. 22	Mar. 25	Mar. 25
HW10/LAB10	Mar. 28	Mar. 29	Apr. 1	
HW11/LAB11	Apr. 4	Apr. 5	Apr. 8	