CIS*3120: Digital Systems I

School of Computer Science
Winter, 2020

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General Course 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.

Course Content

Each line corresponds to roughly *one week* of the semester.

- Overview of digital logic design
- Logic gates, DeMorgan's Equivalent Forms, positive and negative logic
- Truth tables, SOP and POS expressions, Karnaugh maps, Quine-McCluskey method
- Arithmetic Circuits: adder, subtractor, carry-lookahead adder
- Generalized ALU design, combinational multiplier
- Steering Logic: multiplexers, de-multiplexers, decoders, encoders
- Comparators, parity generation/detection circuits
- Sequential logic: SR, D, latches, SR, D, JK, T, flip flops, registers
- Finite-State Machines; state minimization
- Up/down counters, ring counters
- Sequential multiplier (datapath and controller)
- Random-Access Memory (RAM): SRAM and DRAM
- Programmable Devices: PROMs, PALs, PLAs, and FPGAs

Textbook

Mano. M. and M. Ciletti (2015-2019). *Digital Design*, Pearson.

Lectures

There will be *three* lectures per week: MWF (10:30am – 11:20am) in CRSC 117. Due to the nature of the course material most of the lecture material will be presented on the chalk board. Therefore, please make sure to attend class regularly**.** *No online notes are available.*

Homework

Homework problems will be assigned each Monday and will be due the following Monday at the beginning of class. Solutions will be made available the following week in the lab. Late assignments will not be accepted. However, your lowest assignment mark will be dropped when computing your final grade.

Laboratory Exercises

Each week you will be designing and simulating various digital circuits using *LogicWorks* – a Windows based software package. You are required to complete and receive a mark for each exercise during your scheduled two-hour weekly lab session. Late lab assignments will *not* be accepted. Also, you cannot move between lab sections. Therefore, it is strongly recommended that you prepare for each lab exercise before attending the lab.

Course Evaluation

Weight	Description
15%	Weekly Homework Assignments - *weighted equally* - *start January 7*
30%	Weekly Laboratory Exercises - *labs 1 through 10 (equal weight)* - *lab 11 (5%)* - *see lab schedule for dates*
30%	Test 1 (15%) - February 7 (in class; weight of a missed test will be added to final exam) Test 2 (15%) - March 16 (in class; weight of a missed test will be added to final exam)
25%	Final Exam (April 9, 7-9pm)

You must achieve a passing grade on the testing portion of the course (i.e., 27.5 out of 55) and on the lab portion of the course (i.e., 15 out of 30). If you fail to achieve a grade of at least 50% in either of these two cases, the highest final grade that you can achieve is 45%. In this case, a final grade which is greater than 45% will be reduced to 45%. A final grade of 45% or less will remain unchanged.

Graduate Teaching Assistants (GTAs)

- Nastaran Bateni nbateni@uoguelph.ca
- Hannah Szentimrey szentimh@uoguelph.ca

GTAs are responsible for marking homework assignments and lab exercises. All requests for re-grades must be made by email to the GTA who marked the item within *one week* of the marked item being returned.

Advising Hours

An open-door policy will be applied throughout the semester; otherwise, please email me (Gary) to request a specific meeting time. Please do not send questions by email.

A Word of Caution

Needless to say, plagiarism in any form must be dealt with severely. Discussion with fellow students about problems is healthy. However, when answering questions do it yourself. Be original. All cases of academic misconduct are handled by the Dean, in conjunction with the Associate Director of the School. 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.

Lab Schedule for W20

	MON	TUE	WED	THR	FRI
JANUARY			1	2	3
	6 ☺ first class	7	8	9	10
	13	14	15 **Lab 1**	16 **Lab 1**	17
	20	21	22 **Lab 2**	23 **Lab 2**	24
	27	28	29 **Lab 3**	30 **Lab 3**	31
FEBUARY	3	4	5 **Lab 4**	6 **Lab 4**	7 **TEST 1**
	10	11	12 **Lab 5**	13 **Lab 5**	14
Winter Break	17 ☺	18 ☺	19 ☺	20 ☺	21 ☺
	24	25	26 **Lab 6**	27 **Lab 6**	28
MARCH	2	3	4 **Lab 7**	5 **Lab 7**	6
	9	10	11 **Lab 8**	12 **Lab 8**	13
	16 **TEST 2**	17	18 **Lab 9**	19 **Lab 9**	20
	23	24	25 **Lab 10**	26 **Lab 10**	27
APRIL	30	31	1 **Lab 11**	2 **Lab 11**	3 ☺ last class

Lab Times:

- (Sec: 0101) Thursday, 11:30am – 1:20pm, THRN 2418
- (Sec: 0102) Wednesday, 11:30am – 1:20pm, THRN 2418