University of British Columbia
Electrical and Computer Engineering
Digital Design and Microcomputers CPEN312

L01: Course Introduction.

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Lectures

- Wednesdays, Fridays 8:30am to 10:00am: SWNG-221.

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Labs

- In MCLD 410.
- There are 8 sections, 2 hours each. Check:

https://courses.students.ubc.ca/cs/main?pname=subjarea&tname=subjareas&req=3&dept=CPEN&course=312

  - L2A Mon: 5:00 PM to 7:00 PM
  - L2B Mon: 9:00 AM to 11:00 AM
  - L2C Wed: 5:00 PM to 7:00 PM
  - L2D Wed: 2:00 PM to 4:00 PM
  - L2E Thu: 3:30 PM to 5:30 PM
  - L2F Tue: 3:00 PM to 5:00 PM
  - L2J Tue: 5:00 PM to 7:00 PM
  - L2K Mon: 2:00 PM to 4:00 PM
- Labs are for demonstration of work only. You are not supposed to do the lab assignments in the lab, except for lab 1 (maybe).

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TA this year

- Maria Lubeznov
- Mohamed Matar
- Pritam Dash
- TBA

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First Part of the Course: Reference Textbooks

- Most books on digital logic are good for the first part of this course! For your reference here are some books I like:
  - Fundamentals of Digital Logic with VHDL Design By Brown & Vranesic, 3rd Edition.
  - Digital Electronics by Kleitz, 7th Edition.
  - Digital Design by Mano and Ciletti, 5th Edition.
  - Digital Fundamentals by Floyd, 10th Edition.

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Second Part of the Course: Required Manual

- The MCS-51 Microcontroller user's manual will be our reference for the second half of the course. Chapters 1, 2, and 3 only!
- The final exam will be open book.
  - Sharing of material will not be allowed.
  - Printed material only. Electronic devices will not be allowed.
- Available on Connect

intel

MCS® 51 MICROCONTROLLER FAMILY USER'S MANUAL

To: <jesusc@ece.ubc.ca>
Subject: From Intel: Result for you Copyright Permission Request

Approved:
Thank you for contacting Intel Corporation on 5/4/2012 3:31:51 PM.
This email is to inform you that your request for copyright permission has been Approved.

Thank you for visiting our site.

Regards,

Copyright Permission Department

Intel Corporation

ORDER NO.: 272383-002
FEBRUARY 1994

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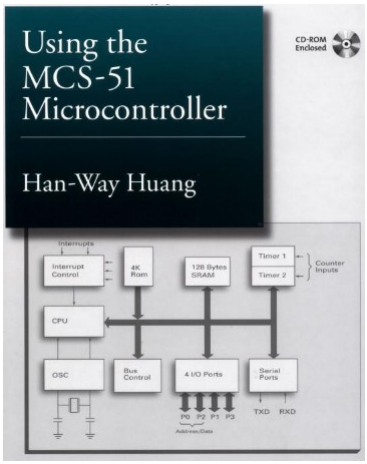
Second Part of the Course: Reference Textbook

Using the MCS-51 Microcontroller, Han-Way Huang, Oxford University Press, 1st edition/December 16, 1999, 0195125134.



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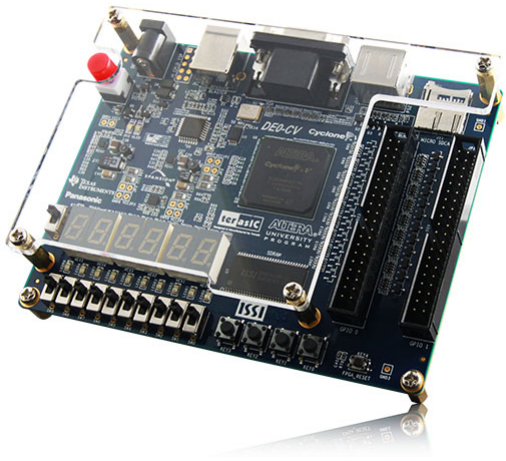
Required Hardware

All Students must have

- Altera DE0-CV board. Buy from Terasic US$89:

  http://UBCCPEN312.terasic.com



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Course Evaluation

The course evaluation consists of two exams and five lab assignments:		
Evaluation:	**Due Date:**	**Worth:**
Lab 0: Mandatory safety training	**Week of January 14**	**0%**
Lab 1: Logic design using discrete gates	**Week of January 28**	**3%**
Lab 2: Arithmetic Circuits	**Week of February 11**	**4%**
Lab 3: Flip/Flops and Counters	**Week of February 25**	**5%**
Midterm Exam (1:30h)	**February 27**	**35%**
Lab 4: Arithmetic in assembly	**Week of March 11**	**4%**
Lab 5: Timers/Counters Applications	**Week of March 25**	**4%**
Final Exam	**TBA: Sometime in April**	**45%**

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Exams

- The midterm exam covers only the first part of the course.
- The final exam covers only the second part of the course. The final exam will be open book.

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Lab Assignments

- Each Lab assignment is to be demoed in the laboratory: you work at home, come to the lab, demonstrate your work, get a mark, and leave. You are not supposed to do the whole lab assignment in the lab! (Exception: lab 1 if you don't own a breadboard)
- Lab work is individual. No group submissions.
- Absolutely no late labs. Late lab=0%. Normal exceptions (medical, for example) apply.

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IMPORTANT: To pass the course:

- You must get a grade of at least 40% in each of the Digital AND for the Microcomputers exam in order to pass the course.

AND

- You must get a average exam grade of at least 50%

AND

- You must also get an aggregate mark of at least 50% overall

AND

- You must get at least 40% average in the labs.

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IMPORTANT: To pass the course:

- You must get a grade of at least 40% in each of the Digital AND for the Microcomputers exam in order to pass the course.

AND

- You must get a average exam grade of at least 50%

AND

- You must also get an aggregate mark of at least 50% overall

AND

- You must get at least 40 % average in the labs.

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Examples:

- Labs 38%, Midterm 100%, Final 80%: FAIL (labs are below 40%). Final grade=47%.
- Labs 90%, Midterm 95%, Final 35%: FAIL (Final exam is below 40%). Final grade=47%.
- Labs 52%, Midterm 62%, Final 48%: PASS. Final grade=53%.
- Labs 75%, Midterm 55%, Final 42%: FAIL (Exams average < 50%). Final grade=47%.
- Labs 85%, Midterm 60%, Final 40%: FAIL (Exams average < 50%, 60*30% + 40*40% = 34%<35%), Final grade=47%.
- Labs 42%, Midterm 60%, Final 44% = FAIL (Aggregate is below 50%: 42*0.3+60*0.3+44*0.4=48%)

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Lecture Schedule

- The Course is divided into two parts:
  - First Part: Digital Logic. From January 2 to February 16. Midterm exam covers this part.
  - Second Part: Microcomputers. From March 1 to April 3. Final exam covers this part ONLY.
  - (Is the last day of classes April 4th???)

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First Part: Digital Logic

Lecture	Description	Date
1	Course Introduction.	Jan 2
2	Number Representation.	Jan 2/4
3	Binary Logic and Gate Implementations	Jan 9
4	Boolean Algebra	Jan 11
5	Reduction Techniques	Jan 16/18
6	Introduction to VHDL	Jan 25
7	Arithmetic Circuits	Jan 25/30
8	Code Converters, Mux, De-Mux	Feb 1
9	ALU, Flip-Flops and Registers	Feb 6
10	Synchronous Counters	Feb 8
11	Finite State Machines	Feb 13/15

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Second Part: Microcomputers.

Lecture	Description	Date
12	Introduction to 8051 Assembly I	March 1
13	Introduction to 8051 Assembly II	March 6
14	Integer Arithmetic I	March 8
15	Integer Arithmetic II	March 13
16	Memory	March 15
17	I/O Ports	March 20
18	Timers and Counters	March 22
19	Interrupts	March 27
20	Serial Port	March 29
21	Serial Peripheral Interface (time permitting!)	April 3

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Course Web Page

- The course material is available via 'Canvas':

  http://canvas.ubc.ca/

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Software Needed

- Quartus II web edition version 16.1 or newer. Older versions may not work! Support for Cyclone V is needed.
  http://dl.altera.com/?edition=lite
- NI Multisim. Download from:
  http://download.ni.com/support/softlib/Core/Circuit_Design_Suite/14.1/14.1/NI_Circuit_Design_Suite_14_1_Education.exe
  The serial number assigned to UBC students is M71X71786
- CrossIDE (second part of the course).
  http://www.ece.ubc.ca/~jesusc/crosside_setup.exe

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Warning: First part of the course

http://upload.wikimedia.org/wikipedia/commons/5/5c/Double-alaskan-rainbow.jpg

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Warning: Second part of the course

http://tornado-facts.com/wp-content/uploads/2009/07/lighting-and-tornado-storm.jpg

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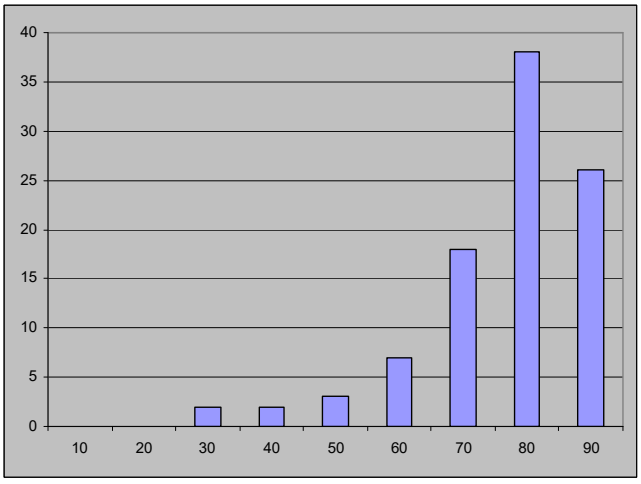
Grade Distribution From Jan 2015



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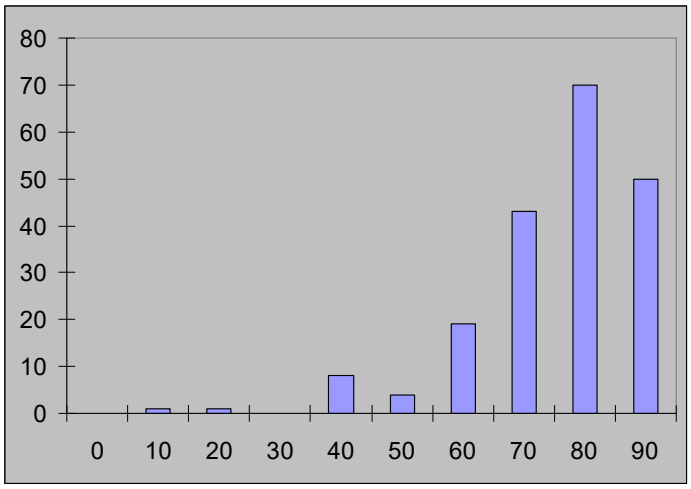
Grade Distribution From Jan 2016



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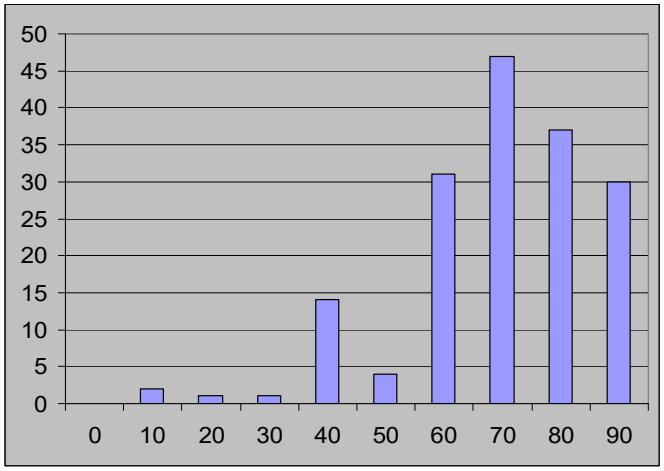
Grade Distribution From Jan 2017



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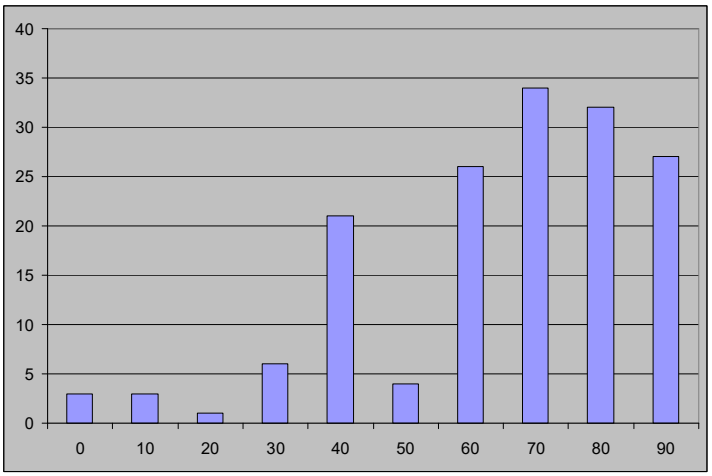
Grade Distribution From Jan 2018



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Statistics from last January 2018

- Number of students in course: 155
  - IGEN: 59
  - ENPH: 64
  - MECH: 32
- Number of students that failed: 34 (21.9%)
  - IGEN: 27 (45.7%)
  - ENPH: 5 (7.81%)
  - MECH: 2 (6.25%)

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Statistics from last January 2018

- Number of students with A+: 27 (17.42%)
  - IGEN: 1 (1.69%)
  - ENPH: 16 (25%)
  - MECH: 10 (31.25%)
- Class average: 69.52%
  - IGEN: 54.5%
  - ENPH: 78.8%
  - MECH: 78.6%

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Assumptions About the Course

- You have done or you are doing a programming course equivalent to APSC 160, e.g. C/C++, Python, or Java programming. If not, then you will probably fail the course.
- You know basic electrical concepts: voltage, current, resistance, insulators, conductors: concepts that you did in Grade 12 Physics.

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