Douglas College

Course Information

A: *Division* Instructional
B: *Department* Pure and Applied Science and Technology

Date June 18, 1997
New Course
Revision of Course X
Dated May 26, 1986

C: CMPT-350 *Course Number*
D: Introduction to Digital Networks *Descriptive Title*
E: 4 *Credits*

F: *Calendar Description*

This course introduces the theory and practice of digital circuit design. Topics include Boolean algebra, expression minimization using mapping techniques, asynchronous and synchronous circuits, flip-flops, memories, arithmetic logic units, controllers, and interfacing to computers. Designs are implemented using a commercial software product. Problems are chosen from computer applications and robotics.

Summary of Revisions

Sections revised:
K

G: *Type of Instruction*

Lecture	2+1 hrs/week
Lab.	2 hrs/week
Seminar	
Clinical Experience	
Practicum	
Shop	
Studio	
Student Directed Learning	5 hrs/week (approx.)
Other	
Total	10 hrs/week

H: Course Prerequisites:
CMPT-220 and
MATH-130

I: *Course Corequisites*
None

J: *Course for which this course is a prerequisite*

K: *Maximum Class Size*
25

L: *College Credit*
Transfer X

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M: *Transfer Credit*
Requested
Granted X

Course Equivalents
U.B.C. ELEC256
S.F.U. CMPT290
Others in transfer guide

Course Designer

Vice-President - Instruction

Dean

Registrar

N: *Textbook and Materials to be Purchased by Students*

- Katz Randy H., Contemporary Logic Design, Benjamin/Cummings Publishing
- LogicWorks 3 Interactive Circuit Design Software manual, Capilano Computing Systems, Ltd.
- Portfolio for logic design assignments
- Two 31/2" high density diskettes

O: *Course Objectives*

The student should be able to:

- analyze problem specifications
- use standard representations to formulate a design meeting the specifications
- implement a design using LogicWorks
- describe the properties of various logic families
- appreciate practical design and implementation issues

P: *Course Content*

1 Introduction
- 1.1 A review of digital systems
- 1.2 A review of digital circuit technologies

2 Digital design representation
- 2.1 Switches, truth tables, boolean algebra, gates, waveforms
- 2.2 Representations and the use of LogicWorks 3

3 Combinational logic
- 3.1 Expression minimization using boolean algebra
- 3.2 Canonical forms
- 3.3 Positive and negative logic
- 3.4 Expression minimization using Karnaugh maps
- 3.5 Conversion to NAND or NOR networks

4 Time Response in Combinational Circuits
- 4.1 Gate delays and timing waveforms
- 4.2 Glitches

5 PALs and PLAs

6 Arithmetic Circuits
- 6.1 Half and fulls adders
- 6.2 Lookahead circuits
- 6.3 Arithmetic Logic Units

7 Sequential Logic
- 7.1 Clocks, flip-flops
- 7.2 Registers, counters
- 7.3 Random access memory

8 Finite State Machines Concepts and Designs

9 Computer organization

10 Controllers
- 10.1 Finite state machines, microprogramming

Q: *Method of Instruction*

There are three components to the course: lectures, labs., and assignments.

The lecture is used to introduce new material; usually via a sequence of theoretical concepts, practical considerations and one or more example case studies. The book is to be used as an additional source of problems and examples.

The two hour weekly lab. is used for the teaching of circuit design using the software product LogicWorks 3 and also to demonstrate practical aspects of digital circuits such as choosing a logic family, power supplies, enclosures, busses, printed circuit design and layout etc. Some labs are dedicated to the evaluation of said topics.

Design assignments may range from designs on paper, or in LogicWorks 3, or even implementations in hardware.

R: *Evaluation*

The final grade will be calculated from a particular distribution from the range below. The exact distribution will be given to the student on the first day of classes along with the course outline and necessary policies.

Distribution Range:

labs. (4 - 7)	=	15% - 25%
2 tests @ 15% - 20% each	=	30% - 40%
1 exam	=	20% - 30%
assignments (4 - 8)	=	20% - 35%

Example Distribution:

6 labs.	=	15%
test #1	=	15%
test #2	=	20%
assignments	=	25%
exam	=	25%
Total	=	100%