

CP/PC319 – Digital System Design

Course Outline

CP/PC319 Digital System Design

Logic families and interfacing considerations for logic devices, VHDL; implementation techniques for combinational and sequential logic; introduction to finite state machines and design methodologies for synchronous and asynchronous sequential circuits; hazards, cycles and races; operation and interfacing of memory devices.

Prerequisite: CP104, CP220/PC220 (or CP120/PC120)

Co-requisite: CP300/PC300 recommended

Cross-Listed: as PC319

Credit: 0.50

Instructor:

Name: Shaowen Song

Office: 2076F

Telephone @ WLU: (519) 884-0710 Ext. 2195

E-mail: ssong@wlu.ca

Office Hours: To be discussed

Reference Books:

There is no required Textbook
The following Reference Books will be used

Reference Textbooks:

Digital Design : Principles and Practices 3rd ed., updated. John F. Wakerly,
Upper Saddle River, N.J. : Prentice Hall ©2001

On-line edition maybe available

Digital Design : Principles and Practices Fifth ed., updated. John F. Wakerly,
Upper Saddle River, N.J. : Prentice Hall ©2001

VHDL Reference books:

VHDL Tutorial

Peter J. Ashenden
EDA CONSULTANT, ASHENDEN DESIGNS PTY. LTD.
www.ashenden.com.au

Course Outline:

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- Introduction to Digital System Design
- Digital Logic and Digital System Review
- Introduction to PCB Design
- PCB Design Tools and Practice
- CMOS Transistors and Logic Gates
- Introduction to FPGAs and ASICs
- Introduction to VHDL
- VHDL Programing for Combinational Circuits
- Sequential Digital Circuit
- Sequential Digital Circuit and Finite State Machines
- VHDL Programing for Finite State Machines

Lab and Grading Scheme:

Lab:

The course does not have a formally scheduled lab period but does require students to do work in the electronics lab and to demonstrate their work to the instructor in the lab.

Marking Scheme:

20%	Assignments
20%	Mini Projects
20%	Midterm Exam
40%	Final Course Project

Tentative Schedule

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Week	Lecture # and Contents	Assignment	Due Data
Week 1 (Th. Sep. 5)	Lecture-1A: Introduction to CP/PC319 Lecture-1: Introduction to Digital System Design	Assignment #1	Thursday Sep. 12, 2019
Week 2 (Sep. 10, 12)	Lecture-2: Digital Logic and Digital System Review Lecture-3: Introduction to PCB Design	Assignment #2	Thursday Sep. 19, 2019
Week 3 (Sep. 17, 19)	Lecture-4: PCB Design Tools and Practice Lecture-5: PCB Design Project	Mini Project #1	Thursday Sep. 26, 2019
Week 4 (Sep. 24, 26)	Lecture-6: CMOS Transistors and Logic Gates – Part 1 Lecture-7: CMOS Transistors and Logic Gates – Part 2		
Week 5 (Oct. 1, 3)	Lecture-8: Introduction to FPGAs and ASICs Lecture-9: Introduction to VHDL		
Week 6 (Oct. 8, 10)	Lecture-10: VHDL Fundamentals – Part 1 Lecture-11: VHDL Fundamentals – Part 2	Assignment #3	Thursday Oct. 24, 2019
Week 7 (Oct. 15, 18)	Thanksgiving and Reading Week		
Week 8 (Oct. 22, 24)	Mid-term Exam Lecture-12: VHDL Fundamentals – Par 3		
Week 9 (Oct. 29, 31)	Lecture-13: Introduction to FPGA Development Tools - Xilinx Lecture-14: Introduction to FPGA Development Tools - Intel	Mini Project #2	Thursday Nov. 7, 2019
Week 10 (Nov. 5,7)	Lecture-15: Combinational Circuit Design Project Lecture-16: Combinational Circuit Design Project	Assignment #4	Thursday Nov. 14, 2019
Week 11 (Nov. 12,14)	Lecture-17: Sequential Digital Circuit Fundamentals Lecture-18: Sequential Digital Circuit Designs and Finite State Machines	Final Project Starts	
Week 12 (Nov. 19,21)	Lecture-19: VHDL Programing for Sequential Circuit and Finite State Machines – Part 1 Lecture-20: VHDL Programing for Sequential Circuit and Finite State Machines – Part 2	Final Project	
Week 13 (Nov. 26,28)	Lecture-21: VHDL Programing for Finite State Machines – Project & Lab Lecture- 22: Final Course Project	Final Project	Thursday Dec. 5, 2019

Course Web Site

The Course Web Site contains materials used in the class and other related materials to the course

Location:

<https://mylearningspace.wlu.ca/>

Course Page: [CP/PC319 – Digital System Design](#)