

# PHYS032

## Digital Design and Logic Switching 3 Credit Units

### ↳ Course Description

This course serves as an introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems, and algorithmic state machine designs. The course covers the basic building blocks and design methods used in the construction of synchronous digital systems, most notably, digital computers. A variety of different representations of digital systems will be described, including truth table, Karnaugh maps, logic gates, state diagrams, and others. Families of highly integrated programmable logic, as well as the more conventional discrete gate logic, will be covered. Digital computer building blocks will serve as hardware case studies throughout the course.

### ↳ Course Objectives

At the end of this course, the learner is expected to have a solid grasp and appreciation of the concepts of digital systems analysis, design, and implementation. Specifically, the learner must have a concrete understanding of how information is represented and processed in digital systems. Moreover, the learner must be able to analyze given digital circuits, as well as to design and implement the same.

### ↳ Course Outline

Binary Systems  
Boolean Algebra and Logic Gates  
Simplification of Boolean Functions  
Combinational Logic  
MSI and PLD Components  
Synchronous Sequential Logic  
Registers, Counters, and the Memory Unit  
Asynchronous Sequential Logic  
Standard Graphic Symbols

### ↳ Grading System

Preliminary Examination	10 %
Midterm Examination	20 %
Prefinal Examination	10 %
Final Examination	20 %
Quizzes	10 %
<u>Project</u>	<u>30 %</u>
TOTAL	100 %

### ↳ Web Resources

**CS9022: Digital System Structures** [<http://www.cse.unsw.edu.au/~cs9022/>]

**CS221 Lecture: Introduction to Digital Logic** [<http://www.math-cs.gordon.edu/courses/cs221/lectures/logic.html>]

**IFT1213: Architecture des Ordinateurs I** [<http://www.iro.umontreal.ca/~dift1213/appaA1.pdf>]

### ↳ Software Resources

**Electronics Workbench** [<http://www.interactiv.com/>]

**Digital Simulator** [<http://www.mit.edu/~ara/ds.html>]

**Digital Works** [<http://www.mecanique.co.uk/digital-works/index.html>]

**Microcap-6** [<http://www.micro-cap.co.uk/>]

### ↳ Reference

Mano, M. Morris, **Digital Design**, 2<sup>nd</sup> Edition. Pearson Education Asia Pte Ltd: Singapore, 2000.

### ↳ Course Instructor

Manuel O. Diaz Jr., BSc *Physics* (AdMU), BSc *CpE* (AdMU), M *InfoTech* (CSU), LI.B. (UNC)  
Consultation Hours : 10:00-12:00 Monday to Friday CS Department

