DIGITAL ELECTRONICS

1. Thông tin về học phần (General Information)

Tên học phần (Course name):   DIGITAL ELECTRONICS

Mã học phần (Course code):   ELE1309

Số tín chỉ (Number of credits):   3

Loại học phần (Course type):   Compulsory

Học phần tiên quyết (Prerequisites):

Học phần trước (Previous courses):
Học phần song hành (Parallel courses):

Các yêu cầu đối với học phần (Course requirements):

- Lecture room: Projector, microphone and speaker, air conditioner.
- Laboratory:

Giờ tín chỉ đối với các hoạt động (Teaching and Learning hours):

- Lectures:	32h
- Exercises:	6h
- Projects & Lab:	4h
- Mid-term exam:	2h
- Individual reading:	1h

Địa chỉ Khoa/Bộ môn phụ trách học phần (Address of the Faculty/Department in charge of the course):

- Address: Faculty of Electronic Engineering 1 - Posts and Telecommunications Institute of Technology, Km10, Nguyen Trai Street, Ha Dong District, Hanoi.
- Phone number: 024-33820866.

2. Mục tiêu học phần (Objectives)
Về kiến thức (Knowledge):
The aim of this course is to provide learners with important knowledge about digital electronic circuits, including:

    o Digital fundamentals, basic logic gate circuits, Boolean algebra.

    o Analysis and design of combination logic circuits.

    o Analysis and design of sequential logic circuits.

    o Structure and operation principles of some common semiconductor memories.

Kỹ năng (Skills):
The aim of this course is to equip learners with skills in:

    o Be able to analyze and design combinational logic circuits and sequential logic circuits.

    o Be able to use some simulation software to simulate the above circuits.

Thái độ, Chuyên cần (Attitude):

o   Be committed to attend all lectures.

o   Be active to participate in class activities.

3. Tóm tắt nội dung học phần (Description)

This course systematically introduces to students the basic concepts in digital electronics, presents them typical digital electronic circuits with fully explaining from basic digital logic gates to combinational and sequential circuits, also provides them with fundamental methods of digital electronic circuits analysis and design.

Students will understand basic principles of combinational and sequential logic design. And they will consolidate their skill of how to design a general-purpose computer, starting with simple logic gates to complex digital circuits.

4. Nội dung chi tiết học phần (Outlines)

CHAPTER 1. NUMBER SYSTEMS

1.1. Popular number systems

1.2. Number system conversion

1.3. Signed binary numbers

1.4. Binary codes

CHAPTER 2. BOOLEAN ALGEBRA AND LOGIC GATES

2.1. Introduction

2.2. Boolean functions representation

2.3. Boole functions minimization/optimization

2.4. Logic gates

CHAPTER 3. COMBINATIONAL LOGIC CIRCUITS

3.1. General concepts

3.2. Combinational logic circuit analysis

3.3. Combinational logic circuit design

3.4. Encoders and decoders

3.5. Multiplexers and demultiplexers

3.6. Arithmetic circuits

3.7. Comparators

3.8. Error detection and error correction circuits

CHAPTER 4. SEQUENTIAL LOGIC CIRCUITS

4.1. General concepts

4.2. Triggers

4.3. Sequential circuit analysis

4.4. Sequential circuit design

4.5. Popular sequential circuits

CHAPTERS 5. MEMORY DEVICES

4.1 Basic memory structures

4.2 ROM

4.3 RAM

5. Học liệu (Textbooks)
5.1. Học liệu bắt buộc (Required Textbooks)

[1]. Digital Electronics Lecture Notes.

5.2. Học liệu tham khảo (Optional Textbooks)

[2]. Logic and Computer Design Fundamentals, 5th Edition by M. Morris Mano and Charles R. Kime. Published by Prentice-Hall, 2015.

[3]. Digital Electronics Lecture Notes (from MIT, Illinois University, Manchester University…)

6. Phương pháp, hình thức kiểm tra – đánh giá kết quả học tập học phần (Grading Policy)

Grading method	Percentage	Group/Individual
- Attendance	10%	Individual
- Labs	10%	Individual
- Assignments	10%	Group
- Mid-term exams	10%	Individual
- Final examination	60%	Individual

Trưởng Bộ môn
(Head of Department)

Giảng viên biên soạn
(Lecturer)

Nguyễn Trung Hiếu

Nguyễn Ngọc Minh