London South Bank University

EST 1892

Module Guide

Analogue and Digital Circuit Design

ENG-5-557

School of Engineering

Level 5

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1.0 MODULE DETAILS

Module Title:	Analogue & Digital Circuit Design
Module Level:	5
Module Reference Number:	ENG-5-557
Credit Value:	20
Student Study Hours:	150
Contact Hours:	48
Private Study Hours:	102
Pre-requisite Learning (If applicable):	Introduction to Digital Electronics
Co-requisite Modules (If applicable):	
Course(s):	EEE, TECNE, CNS
Year and Semester	2019-20, Semester 1
Module Coordinator:	Dr Antonio Vilches
UC Contact Details (Tel, Email, Room)	x7527, vilchesa@lsbu.ac.uk
Teaching Team & Contact Details (If applicable):	Dr Tony Vilches & Dr Sevan Harput
Subject Area:	Electronics
Summary of Assessment Method:	Exam:50% Workshop & Assignments: 50%

2.0 SHORT DESCRIPTION

This module aims to teach the student material that an Electronic engineer should know before proceeding with analogue, digital and microprocessor system designs. This includes topics relating to electronic component and subsystem behaviour, system modelling, microprocessor and related hardware operation and programming. General background is provided to the technologies that are available for implementation and modelling of electronic and microprocessor based systems together with examples of simple applications that can be used in various engineering product designs.

3.0 AIMS OF THE MODULE

To teach students how to specify and design discrete and integrated analogue and digital systems that form part of a wide range of consumer and engineering products.

4.0 LEARNING OUTCOMES

On successful completion of the module, students will be expected to:

Know the technologies that are available for implementation of electronic and computer subsystems

Design circuits using active devices

Predict circuit behaviour and performance using standard methods Understand the use and effect of feedback in circuits

Understand the use of power control circuits

Understand the concept of digital design

Know how to use a HDL to program a PLD

Select suitable hardware components and software tools to implement and verify the electronic system design to be carried out.

To understand the principles involved in specific designs and appreciate the design constraints due to the hardware and software involved.

Know how to manage, plan and document a mini-project.

5.0 INTRODUCTION TO STUDYING THE MODULE

5.1 OVERVIEW OF THE MAIN CONTENT

The module involves the main aspects of the analogue and digital combinatorial circuit design. It provides information on the design procedures, the modern hardware components and the CAD and the software packages used in the design and the simulation. Students are taught some of the most commonly used methods of circuit analysis and synthesis of analogue and digital systems. They will learn how to proceed in stages from a technical specification to a complete circuit design. Some of the practical assignments develop the design skills using software simulation packages.

5.2 OVERVIEW OF TYPES OF CLASSES

The lectures cover a selection of some key topics on the theory and the procedures of the digital design. The workshops enhance the material presented in the lectures and provide a practical means of applying the learned theory to real simple designs. Students are expected to attend all lectures. Students are required to read the core text textbooks recommended in the section Supporting Materials.

5.3 IMPORTANCE OF STUDENT SELF-MANAGED LEARNING TIME

The self-study represents the most important part of the Module. The lectures, serve only as pointers to acquiring the skills in the subject.
Students are expected to use several core and supplementary resources to obtain an alternative and deeper view of the material presented in the lectures. The level of competence required for the end of module exam can be only achieved by students working independently on the tutorial examples provided for the module and also in the supporting material listed at the end of this Module Guide.
A spare time access to a PC linked to the Internet is essential in order for the student to get the relevant experience of using the free download design software available from a number of digital IC manufacturers.

6.0 THE PROGRAMME OF TEACHING

<u>Analogue Part:</u>

Weeks 1-6
During these weeks analogue electronics concepts are covered and the study of devices such as BJT transistors and common circuits, FET Transistors and common circuits, basics of Operational Amplifiers chips and design of active filters. This material is presented by Dr Oswaldo Cadenas.

<u>Digital Part</u>

Weeks 7-9:
Use of Hardware Description Languages (HDL) and the Programmable Logic Devices (PLD) circuits.

Weeks 9-10:
Sequential Logic, Counters

Weeks 11-12:
Synchronous Finite State Machines: Bubble charts, Next State Tables, Excitation Maps.

7.0 ASSESMENT OF THE MODULE

The assessment consists of an end of module written exam of two hours duration (weighing 50%) and the coursework (weighing 50%). The coursework component is based on two separate workshops: one for the Analogue part and the second one for the Digital Part (each part's coursework weighing 25%).

Workshop (Analogue and Digital) run for 6 consequtive weeks each. There are no workshops in the teaching week 13.

The attendance of workshops is compulsory and forms part of the workshop assessment component. Any absences from a workshop require a prior agreement with the workshop instructor or, if not possible, a medical certificate.
Failure (or non-submission) in any of the two assignments will constitute a failure of the whole Module.

The lab logbooks and the formal assignments are to be **submitted through the faculty office for the attention of the Lecturer who set the Assignment for the part taught.**

Late submissions of the coursework shall be penalised in accordance with the University regulations.

Workshop Submission Dates:
The Analogue part lab submission has a deadline published online in the Moodle site.
The Digital part lab submission is the Friday of the teaching week 13.

8.0 LEARNING RESOURCES

8.1 CORE MATERIALS

Digital Part:

Fundamentals of Logic Design, C.H. Roth

This book can be purchased as a print or e-book from the publisher's website
http://www.cengagebrain.co.uk/shop/search/9781133628484

Digital Fundamentals with VHDL, T.L. Floyd, Prentice Hall, 2001.

Analogue Part:

Electronics - A Systems Approach, N. Storey, Pearson 2009.

The Art of Electronics, P. Horowitz, W. Hill, Cambridge University Press. 1998.

8.2 OPTIONAL MATERIALS

Digital Design - Principles & Practices, J. Wakerly, Prentice Hall. 1999.

Electronic Devices, T.L. Floyd, Prentice Hall, 2001.