ELE3103 APPLIED DIGITAL ELECTRONICS

Hours per Semester				Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
45	30	00	60	100	60	40	4

[Prerequisite: Introduction to Digital Electronics]

Rationale

The course treats digital electronics focusing on applications of digital electronics in logic circuits and digital storage.

Course Objectives

By the end of the course students should be able to:

- Understand operations and applications of digital electronic circuits
- Analyse and sysnthesise digital electronic circuits
- To build and test digital electronic circuits

Detailed Course Content:

Digital ICs: **[3 Hours]**

Digital IC technology, Digital ICs and Linear ICs, SSI, MSI, LSI, VLSI, ULSI chips. Digital IC technology and manufacturer's data sheets.

Logic circuits: **[9 Hours]**

Logic families: TTL, ECL, CMOS, I^2L Characteristics; Fall-in; Fall-out; speed; power and noise performance; Interconnection: Interfacing logic families; interfacing with buses, interfacing digital and analogue systems.

Digital storage and Memory Circuits: **[6 Hours]**

Semi conductor memories: ROM; static and dynamic RAM; PROM; EPROM, EEPROM; Special Memories and applications; Memory organization; Memory chips; Magnetic Buble Memories CCDs; PLDs

Clock generation: **[6 Hours]**

Sweep generators; Monostables and Astables; Schmitt triggers; Multiplexers and demultiplexers; coders, decoders and code converters.

Digital Systems Design: **[9 Hours]**

ASM chart, data processor, Control logic subsystems. Synchronous sequential circuits: Analysis and design; staste tables; state diagrams; excitation tables. Asynchronous sequential circuits: analysis and design.

Programmable Logic Controllers: **[6 Hours]**

Basics of PLCs, PLC Hardware Components, Basics of PLC Programming, Counter and Timer Instructions; Wiring Diagrams and Ladder Logic Programs; Programming Timers and Counters; Program Control Instructions; Data Manipulation Instructions; Math Instructions; Sequencer and Shift Register Instructions

Introduction to design and fabrication of Digital ICs: **[6 Hours]**

Digital IC Design, ASICs, FPGAs

Mode of Delivery

The course will be taught by using lectures, tutorials and assignments.

Assessment
Assignments, tests, laboratories, and final examination. Their relative contributions to the final grade are :

Requirement	**Percentage contribution**
Course work (Assignments, laboratories, tests)	40
% Final examination	60
% **Total**	**100%**

Learning Outcomes
On completion of this course the student will be able to:

- Represent numerical values in various number systems and perform number conversions between different number systems.
- Demonstrate the knowledge of: operation of logic gates (AND, OR, NAND, NOR, XOR, XNOR) using IEEE/ANSI standard symbols; Boolean algebra including algebraic manipulation/simplification, and application of DeMorgan's theorems; Karnaugh map reduction method.
- Demonstrate the knowledge of operation of basic types of flip-flops, registers, counters, decoders, encoders, multiplexers, and de-multiplexers.
- Analyze and design digital combinational circuits including arithmetic circuits (half adder, full adder, multiplier).
- Analyze sequential digital circuits.
- Demonstrate knowledge of the nomenclature and technology in the area of memory devices: ROM, RAM, PROM, PLD, FPGAs, etc

Method of Teaching /Delivery
The course will be taught by using lectures, tutorials and assignments.

Mode of Assessment
Assignments, tests and final examination. Their relative contributions to the final grade are :

Requirement	**Percentage contribution**
Course work (Assignments, tests)	40
% Final examination	60
% **Total**	**100%**

Recommended and Reference Books

[1] Agarwal, Anant and Jeffrey H. Lang, *Foundations of Analog and Digital Electronic Circuits,* Morgan Kaufmann Publishers, Elsevier, July 2005.

[2] Ronald J. Tocci and Neal S. Widmer, *Digital Systems: Principles and Applications*, Prentice Hall, India, 2004

[4] Douglas A. Pucknell, *Fundamentals of Digital Logic Design with VLSI Circuit*

Applications, Prentice-Hall, 1990
[5] Ronald J. Tocci, *Digital Systems: Principles & Applications,* 6th ed., Prentice Hall, 1995.

Possible Lecturers:
Dr. J. Butime
Mr. D. Nsubuga Mubiru
Mr. P. Bogere
Mr. G. Bakkabulindi