

### Section 1: Course Summary

Course Name	Digital Electronics Fundamentals
Course Code	ETC1033
Lecturer(s)	Dr. Richard Wong
Category	Core
Semester/Year Offered	Semester 3 / Year 1
SLT Credit Hours	3
Pre-requisite (if any)	
Synopsis	The course introduces the fundamentals of a digital system which comprise of digital number systems, Boolean algebra, logic gates, combinatorial circuits, and sequential circuits.
Transferable Skills	Analytical Skills, Problem-Solving and Scientific Skills
Delivery Method	Lectures, Tutorials, and Laboratory Practices

### Section 2: Course Outcomes

Mapping of the Course Outcomes (CO) to Programme Outcomes (PO), Knowledge Profile (WK), Complex Problem Solving (WP), and Complex Engineering Activities (EA).

At the end of this course, the student will be able to:

Course Outcome (CO)	
CO1	<b>Perform</b> conversion between different number systems and codes in digital electronics.
CO2	<b>Identify</b> canonical forms of Boolean functions.
CO3	<b>Implement</b> digital circuits using logic gates and flip-flops according to design specifications.
CO4	<b>Evaluate</b> timing responses of a given sequential circuit.

Note: LD/BT = Learning Domain/Bloom's Taxonomy

Mapping of the Course Outcomes (CO) to Programme Outcomes (PO), and Programme Educational Objectives (PEO). Relational Indicator is "X".

CO	PO												PEO		
	1	2	3	4	5	6	7	8	9	10	11	12	PEO1	PEO2	PEO3
CO1	X												X		
CO2		X											X		
CO3			X										X		
CO4		X											X		

### Section 3: Teaching-Learning Assessment Strategy

Mapping of the Assessment Components and Assessment Methods to the Course Outcomes (CO). Relational Indicator is "X".

Assessment Components	Assessment Methods	Weightage (%)	CO1	CO2	CO3	CO4
Written Assessment	Test(s)	10	X			X
	Final Examination	60	X	X	X	X
Assignment	Assignment(s)	20			X	
Laboratory	Open-ended Experiment 1	5		X		

(Graded)	Open-ended Experiment 2	5				X
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Mapping of the Teaching-Learning Activities and Assessment components to the Programme Outcomes (PO).

Programme Outcomes (PO)	Teaching-Learning Activities	Assessment Components
PO1	Lectures, Tutorials, Laboratory Practices	Test, Final Examination
PO2	Lectures, Tutorials, Laboratory Practices	Test, Final Examination, Open-ended Experiment
PO3	Lectures, Tutorials, Laboratory Practices	Assignment, Final Examination

#### Section 4: Teaching Plan and Student Learning Time (SLT)

Summary of total Student Learning Time (SLT).

SLT Components: L = Lecture T = Tutorial P = Practical A = Assessment O = Others	Face to Face					Independent Learning
	L	T	P	A	O	
	28	14	14	3		61
Total SLT Hours	120					
SLT Credit Hours	3					

Teaching Plan and Student Learning Time (SLT).

Teaching-Learning Plan: Course Topic and Outline	Student Learning Time (SLT)						Topic SLT
	L	T	P	A	O	IL	
<b>Number system</b>	6	3	3			6	18
<ul style="list-style-type: none"> <li>• Base conversion</li> <li>• Signed numbers</li> <li>• Binary operations</li> <li>• Binary codes</li> <li>• ASCII code</li> <li>• Floating-point representation</li> </ul>							
<b>Boolean algebra</b>	6	3	3			6	18
<ul style="list-style-type: none"> <li>• Logic operations</li> <li>• Truth table</li> <li>• Boolean algebraic manipulation</li> <li>• Karnaugh map</li> <li>• Algebraic Simplification</li> <li>• Automated Methods of Minimisation</li> </ul>							
<b>Logic gates</b>	4	2	2			4	12
<ul style="list-style-type: none"> <li>• AND gate</li> <li>• OR gate</li> <li>• NOT gate</li> <li>• NAND gate</li> <li>• XOR gate</li> </ul>							
<b>Combinatorial circuits</b>	6	3	3			6	18
<ul style="list-style-type: none"> <li>• Adders and Subtractors</li> <li>• Multiplexers</li> <li>• Demultiplexers</li> <li>• Decoders</li> <li>• Encoders</li> </ul>							

• Propagation Delay and Hazard Design						
<b>Sequential circuits</b>	6	3	3		6	18
• State diagrams						
• Flip-Flops						
• Bistables						
• Monostables or One-shots						
• Astables						
• Timers						
• Memory Registers						
• Shift Registers						
• Counters						
• Design of Sequential Logic Circuits						
• Programmable Logic Array						
• Programmable Logic Device						
Laboratory (2 Graded Reports with 1000 words each)					10	10
Assignment (2000 words)					10	10
Test				1	3	4
Final Examination				2	10	12
Sub-total for each SLT components	28	14	14	3	61	120
Total SLT Hours (15 Weeks)					120	
SLT Credit Hours					3	

References:

Main Reference	Thomas L. Floyd, Digital Fundamentals, 11th Edition, 2014, Pearson Education Limited.
Additional References	Tertulien Ndjountche, Digital Electronics 1: Combinational Logic Circuits, 1st Edition, 2016, Wiley-ISTE.
	Tertulien Ndjountche, Digital Electronics 2: Sequential and Arithmetic Logic Circuits, 1st Edition, 2016, Wiley-ISTE.