COURSE SYLLABUS
(ELECTRICAL & ELECTRONICS ENGINEERING PROGRAM)

FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING UNIVERSITI PERTAHANAN NASIONAL MALAYSIA **NAME DAN COURSE CODE :** DIGITAL ELECTRONICS, EEE 1213	**M/S :** 1 / 6

Lecture Hours : 3 hrs x 14 weeks **Credit** : 3 **LECTURER:** MUHAZAM BIN MUSTAPHA Bistari 08-R-16 | muhazam@upnm.edu.my	**Revision** : A **Date of Issue** : 1 February 2011 **Last Amendment** : - **Edition** : 1 **Procedure No : PK(0). UPNM. AKAD. 01**

PRE REQUISITE : - nil -

SYNOPSIS:

This course exposes students to fundamental of digital electronic field. The advantages and disadvantages of digital and analog will be discussed. Aside from that, number and code systems, combinational logic elements and sequence basics will also be covered.

Emphasis will be put on output equation generation and truth table for realization using design and minimization techniques. The rationale behind the minimization will be discussed and further elaborated.

Besides that, this course will also be focusing on designing simple combinational and sequential logic circuits, arithmetic logic circuits, analysis and synthesis of combinational circuits designed by traditional methods, as well as some introduction to ECAD.

REFERENCES :

1. Thomas L. Floyd, *Digital Fundamental*, 10th Edition, Pearson, 2009
2. Ken Reid & Robert Dueck, *Introduction to Digital Electronics*, Thomson, 2008
3. Randy H. Katz, *Contemporary Logic Design*, 2nd Edition, Pearson, 2006
4. Stephen Brown & Zvonko Vranesic, *Fundamentals of Digital Logic with Verilog Design*, 2nd Edition, McGraw Hill, 2008
5. Stephen Brown & Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, 2nd Edition, McGraw Hill, 2008

Prepared by : Name: **Muhazam Mustapha** Signature : Date :	Certified by : Name: **Nik Ghazali Nik Daud** Head of Department Signature : Date :

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OBJECTIVE:

This course is to prepare the students with the basic knowledge of digital electronics and logic design. The skill would be in term of theories on combinational and sequential circuits and introductory skill with ECAD design.

COURSE OUTCOME :

CO1	Knowledge on combinational digital circuit
CO2	Knowledge on sequential digital circuit
CO3	Knowledge and hands-on skill on ECAD based design of digital circuits

LESSON PLAN :

WEEK	LECTURE	TOPIC / CONTENT	REMARK
1 - 2	1	**Number Systems**: Why digital system? positional number system, negative number representation, binary codes	
3	2	**Boolean Algebra**: calculus of truth, boolean values, operations, functions, truth table, canonical forms, boolean algebra laws, deMorgan's theorem, duality principle, gates, gate fabrication technology	
4 – 5	3	**Boolean Function Simplification**: simplification by boolean algebra, K-map, Quin-McCluskey, don't cares	Quiz 1 Assignment 1 Commencement
		MID SEMESTER BREAK	
6	4	**Standard SSI & MSI Combinational Circuit Implementations**: 74 series, TTL high and low input output level, high-z (tri-state), delay and power boost-up (buffers), multiplexer, demultiplexer, decoder, gray converter, 2's comp circuit, adder (half & full), carry prediction, ripple carry	Quiz 2
7	5	**Boolean Function SSI & MSI Realization**: universality of nand & nor gates, by multiplexer, demultiplexer, decoder, 74 series	Quiz 3
8	6	**LabView ECAD**: panels, controls, block diagrams, indicators, palettes, structures, timers, counters, sub VI	PBL Assignment Commencement
9	7	**Sequential Elements – Flip-flops and Latch**: SR latch, SR flip-flop, JK, D, T, excitation equation, circuits	Quiz 4
10	8	**Standard SSI & MSI Sequential Circuit Implementations**: 74 series, flip-flops, counters, shift registers, speed consideration – setup & hold time	Quiz 5
11 – 12	9	**Finite State Machine**: mealy & moore machine, FSM design steps, state minimization, synchronous & asynchronous FSM, output & state implementation	Test Covers up to Chapter 7
13	10	**LSI and Beyond**: memory: rom, prom, ram, sram, dram, structuring programmable logic: PLD, PAL, PLA, GAL, SPLD, CPLD, FPGA	
14		**Revision**:	
		FINAL EXAMINATION (50 %)	
		FINAL BREAK SEMESTER 1	

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LEARNING LOAD

NO	TEACHING AND LEARNING ACTIVITIES	HOURS
1	Lectures and Tutorials	42
2	Individual & Group Assignments: • Assignment assessment and answering problems	30
3	Individual / Group Learning: • Preparation before lectures including reading modules and notes • Preparation after lectures includes updating notes, reading additional references, discussion with peers and lecturers • Revision for test and final exam	43
4	Test	2
5	Final Exam	3
	TOTAL HOURS	**120**

Course Credit 'Digital System Design' 120 hours / 40 hours = 3 credit

METHODOLOGY :

Lectures and tutorials

COURSE EVALUATION :

1.	Quizzes 1-5	10 %	CO: 1, 2
2.	Assignment	10 %	CO: 1
3.	PBL	10 %	CO: 3
4.	Test	20 %	CO: 1, 2
5.	Final Exam	50%	CO: 1, 2
	Total	**100%**	

Rules & Regulation :

Refer to *Peraturan Akademik UPNM*

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RELATIONSHIP BETWEEN PROGRAMME OUTCOME (PO) With COURSE LEARNING OUTCOME (CO)

No	COURSE OUTCOME (CO)	Relationship Between C.O and P.O. (Includes 8 domains in MQF)									Delivery	Assessment
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		
CO1	Knowledge on combinational digital circuit	3									Lecture, Tutorial	Test / Quiz / assignment / exam
CO2	Knowledge on sequential digital circuit	3									Lecture, Tutorial	Test / Quiz / exam
CO3	Knowledge and hands-on skill on ECAD based design of digital circuits	3			1						Lecture	Assignment

RELATIONSHIP BETWEEN (CO) AND GENERIC / SOFT SKILLS

Generic / Soft Skill	CO1	CO2	CO3	Evaluation
Communication				
Critical Thinking & Problem Solving	3	3	3	Test / assignment / exam
Team Work				
Life-long Learning & Information Management			1	assignment
Entrepreneurship				
Ethics & Professional Morale				
Leadership				
Environmental Awareness				

Legend:

1: Knowledge
2: Moderate
3: Important/Relevant

EXAMPLES OF EVALUATION (RUBRIK) :

COURSE OUTCOME (CO)	A (5)	B (4)	C (3)	D (2)	E (1)
Understand the engineering profession as well as the interaction between various engineering disciplines.	Solve problems with less than 20% error	Solve problems with less than 35% error	Solve problems with less than 50% error	Solve problems with more than 60% error	Solve problems with more than 70% error
Understand the engineering fundamentals & elements.	Solve problems with less than 20% error	Solve problems with less than 35% error	Solve problems with less than 50% error	Solve problems with more than 60% error	Solve problems with more than 70% error
Understand the procedure for approaching an engineering problem, determining the necessary data and method of solution and presenting results.	Solve problems with less than 20% error	Solve problems with less than 35% error	Solve problems with less than 50% error	Solve problems with more than 60% error	Solve problems with more than 70% error
Enhance the ability to use software application for the analysis and presentation of engineering data.	Solve problems with less than 20% error	Solve problems with less than 35% error	Solve problems with less than 50% error	Solve problems with more than 60% error	Solve problems with more than 70% error

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NOTE: PROGRAMME OUTCOME (PO) FOR DEFENCE HUMAN RESOURCE MANAGEMENT

MQF has established that Outcome Based Learning emphasizes the development on student's competency in multiple learning environments using the following 8 domains:

i. Knowledge
ii. Practical
iii. Leadership
iv. Ethics and Professionalism
v. Environment Awareness
vi. Entrepreneurship
vii. Communication
viii. Life-long Learning

PO1	Be able to integrate and design systems and components systematically to fulfill the requirements while taking into considerations of any economical, social, ethical, health, safety and sustainability and environmental issues in Electrical & Electronic Engineering.
PO2	Be able to use and gather facts in mathematics and sciences, and also in fundamental and specific knowledge in solving complex engineering problems.
PO3	Be able to analyze complex problems, to include designing experiments, analysis and interpretation of data and synthesizing information in arriving to sound conclusion.
PO4	Realize the need of lifelong learning, seeking new knowledge and skills, and innovative knowledge analysis.
PO5	Be able to establish cultural and personality sensitivity climates that enable effective communications and improve interactions with subordinates, team members, peers, and general public.
PO6	Be able to demonstrate the understanding of their roles and responsibilities, as leaders or team members in protecting public well being by taking collaborative actions in multi-disciplined teams.
PO7	Possess strong spiritual values and decorum, act ethically and demonstrating sensitiveness towards safety and the environment in executing duties.
PO8	Be able to demonstrate the understanding of the elements in project management, assets management and public policies, administrations, business and entrepreneurship.
PO9	Be able to demonstrate the understanding about military organizations, equipment, and current issues.

END