COURSE SYLLABUS

FACULTY OF ENGINEERING NATIONAL DEFENCE UNIVERSITY MALAYSIA **Name and Course Code: Intro to Electrical Engineering/ ECA1212**	**Page :** 1 / 7

Lecture Hours : 2 hrs x 14 weeks **Tutorial/PBL Hours** : 1 hr x 14 weeks **LECTURER** : Engr. Muhazam Mustapha	**Revision : B** **Date of Issue :** 6 Jul 2010 **Last Amendment :** 21 Sep 2011 **Edition :** 1 **Procedure No. :** PK (O). UPNM.AKAD.01

PRE REQUISITE : NONE

SYNOPSIS:

This is a core subject for non-Electrical Engineering students taken in the first year of their program. This course is divided into two parts: Electrical and Electronics Engineering.

Basic Electrical Engineering covers circuit theory and electric machine. Students are also exposed to topics on magnetic circuits, transformer and calculation on electrical power.

Electronics explores topics concerned on analog and digital. Analog electronics covers semiconductor devices (Bipolar Junction Transistor, BJT), Field Effect Transistor (FET) and operational amplifier. Digital electronics on the other hands covers logic design and basic microcomputers.

Text Books:

1. Rizzoni, G. (2009). **Principles and Applications of Electrical Engineering**, 5th Ed. McGraw-Hill Higher Education

References:

2. Nilsson; Riedel (2008). **Electric Circuits,** 8th Ed. Prentice Hall.
3. Tocci, R.J. and Widmer, N.S. (2007). **Digital Systems: Principles & Applications,** 10th Ed. Pearson.
4. Floyd, T.L. (2008). **Electronic Devices (Conventional Current Version),** 8th Ed**.** Pearson.
5. Floyd, T.L. (2006). **Digital Fundamentals, 9th Ed.** Pearson.
6. Dorf, R.C. and Svoboda, J.A. (2006). **Introduction to Electric Ciruits,** 7th Ed. John Wiley & Son**.**
7. Sadiku, A. (2009). **Fundamentals of Electric Circuits**, 4th Ed. McGraw-Hill Higher Education

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FACULTY OF ENGINEERING
NATIONAL DEFENCE UNIVERSITY MALAYSIA

Name and Course Code: Intro to Electrical Engineering/ ECA1212

OBJECTIVES:

Upon completion of this course, students should be able to acquire knowledge and understanding of electrical engineering principles relevant to any engineering disciplines.

COURSE OUTCOMES:

CO1	Able to understand and explain the operations and structures of the semiconductor components and circuits, and electric machines.
CO2	Able to solve simple DC circuit theory problems.
CO3	Able to design simple combinations of logic systems.

TEACHING PLAN:

Week	Topics
1	**Units, Definitions, Experimental Laws and Simple Circuits** System of units, charge, current, voltage and power types of circuits and elements. Ohms law, Kirchhoff's laws, resistance and source combination, voltage and current division.
2-3	**Circuit Analysis Techniques** Nodal and mesh analyses, source transformations, Thevenin's and Norton's theorems.
4	**Inductance and Capacitance** The v-i relations for inductor and capacitor, inductor and capacitor combinations, duality, linearity and its consequences.
5	**Basic Electronic Devices** Diode: characteristics and application, rectifier diodes, diode circuit analysis, semiconductor diodes.
6	**Bipolar-Junction Transistor (BJT)** Structure and operation, NPN and PNP transistors, characteristics, transistor circuit analysis, common emitter configuration
7	**Field Effect Transistor (FET)** Structure, types, mode of operation, FET technology in digital electronics
8	**Electronic Circuit** Operational amplifier: characteristics, types of operational amplifier and applications.
9	**Digital Logic: Numbers and Combinational Concepts** Concepts of logic operations, functions, logic gate synthesis, Boolean theorems, DeMorgan's theorems, flip-flops, counters and registers.
10	**Digital Logic: Sequential Concepts and Memory** Concepts of logic operations, functions, logic gate synthesis, Boolean theorems, DeMorgan's theorems, flip-flops, counters and registers.
11	**Digital Systems** Microcomputers (assembly, source-code), Computer-based instrumentation systems.
12	**Magnetic Circuits and Devices** Concept and laws of magnetism and analysis of transformers. Introduction to electromechanical energy conversion, operation of machines as generators and motors, power loss, efficiency and operations at maximum efficiency.
13	**Electrical Machines** DC machines- DC motors, generator, AC machines, AC induction motor, synchronous motor
14	Revision

Learning Load

Ser	Teaching and Learning Activities	Hours
1	Lecture	28
2	Tutorial	14
3	Individual Assignments • Reading and finding relevant reading materials • Preparation of assignment	28
4	Quizzes	1
5	Test (2 sets)	4
6	Final Examination	3
	TOTAL	**120**

Course Credit for '**Intro to Electrical Engineering** 'is 120 hrs / 40 hrs = 2 (2credits)

TEACHING METHODOLOGY :

1. Students exposed to the fundamental concepts in applied mechanics and given as many examples as possible on the application of such principles to solve related problems.
2. Students are required to go through the tutorial sets.
3. Students are encouraged to expose themselves to circuit problems from various other sources.

COURSE ASSESSMENT:

Assignments	10%
Quizzes	10%
Test 1	15%
Test 2	15%
Final Exam	50%

Rules and Regulations:

Refer to *Peraturan Akademik UPNM*

Relationship Between Programme Learning Outcome (PO) and Course Learning Outcome (CO)

	Course Learning Outcome (CO)	**Relatioship with Programme Learning Outcome (PO)**											**Delivery**	**Assessment**
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		
1	Able to understand and explain the operations and structures of the semiconductor components and circuits, and electric machines.	3	1	3									Lecture, Tutorial	Exams, Tests, Quizzes
2	Able to solve simple DC circuit theory problems.	3	2	3									Lecture, Tutorial	Exams, Tests, Quizzes
3	Able to design simple combinations of logic systems.	3	1	3									Lecture, Tutorial	Exams, Tests, Quizzes, Assignment

1 = CO contribute partially to program outcomes without assessment, 2 = CO contribute partially to program outcomes with formal assessment
3 = CO contribute fully to program outcomes with formal assessment

Relationship between CO and Generic Skills

Generic Skills	CO1	CO2	CO3	Assessment
Communication				
Critical Thinking and Problem Solving	3	3	3	Tests, Quiz, Assignment, Exam
Team work				
Life-Long Learning and Information Management				
Enterpreniurship				
Ethics and Morale				
Leadership				
Environmental Awareness				

Legend:
1: Knowledge
2: Moderate
3: Important/Very relevant

Program Learning Outcome is the ability of the student to adapt all learning domains to show their proof of competency. This ability includes 8 domains in Malaysian Qualification Agency (MQA) and they are:

i. Knowledge;
ii. Practical skills;
iii. Social skills and responsibilities;
iv. Values, attitudes and professionalism;
v. Communication, leadership and team skills;
vi. Problem solving and scientific skills;
vii. Information management and lifelong learning skills; and
viii. Managerial and entrepreneurial skills.

PO	Definition	MQF PO	Taxonomy
PO1	Ability to acquire and apply knowledge of sciences, civil engineering principles.	PO1	C
PO2	Ability to apply techniques, skills and use modern engineering tools.	PO2	P
PO3	Ability to identify, formulate and solve civil engineering related problems.	PO6	C
PO4	Ability to utilize systems approach to design and evaluation of operational performance.	PO2, PO6	C, P
PO5	Ability to communicate effectively and with confidence not only with engineers but also with the community at large.	PO5	A
PO6	Ability to respond and adapt to changing situations with special attention toward sustainable development or defense applications.	PO7	A
PO7	Ability to function effectively as an individual and/or in group with the capacity to be a leader/manager to achieve common goals.	PO5	A
PO8	Ability to adopt of professional ethical responsibilities and commitment to them.	PO4	A
PO9	Ability to incorporate the social, cultural, global and environmental responsibilities of a professional engineer in civilian and military context.	PO3	A
PO10	Ability to seek and acquire contemporary knowledge including defense matters.	PO7	A
PO11	Ability to possess entrepreneurship qualities.	PO8	A