No	Information of Electronic Devices and Circuits (Digital)	
1	Unit name:	Electronic Devices and Circuits (Digital)
2	Code:	NE-4033
3	Classification:	Basic Electronic Subject
4	Credit value:	3
5	Semester/ Year Offered:	2/3
6	Pre-requisite:	NA
7	Mode of delivery:	Lecture, Practical
8	Assessment system and breakdown of marks:	Assignment, Tutorial, Exam
	Practical	20%
	Tutorial	20%
	Midterm	30%
	Exam	30%
9	Academic staff teaching unit:	Department of Nuclear Technology
10	Course outcome of unit: After completion of this course, students will be able to 1. explain the basic differences between digital and analog quantities 2. apply conversion from decimal to binary and from binary to decimal 3. construct various logic gates and timing diagrams showing the proper time relationships of inputs and outputs for them 4. apply gate combinations with Boolean expressions 5. analyze basic combinational logic circuits for given Boolean output expressions 6. apply BCD-to-7-segment decoders in display systems and decimal-to-BCD priority encoder in a simple keyboard application 7. apply latches, flip-flops, and timers in basic applications 8. identify the basic forms of data movement in shift registers	

11	Synopsis of unit: “Electronic devices and circuits (Digital)” subject ensures that the basic differences between digital and analog quantities are explained. The first step is to construct the various logic gates and timing diagrams showing the proper time relationships of inputs and outputs for them. Basic combinational logic circuits for given Boolean output expressions are used to analyze basic combinational logic circuits, such as NOT, AND, OR, NAND, NOR, exclusive-OR, and exclusive-NOR gates. After all, BCD-to-7-segment decoders in display systems and decimal-to-BCD priority encoder in a simple keyboard application are applied and these materials lay the groundwork for the study of latches, flip-flops, and timers in basic applications and other circuits that identify the basic forms of data movement in shift registers.
12	Topic: 1. Introductory Concepts 2. Number Systems, Operations, and Codes 3. Logic Gates 4. Boolean Algebra and Logic Simplification 5. Combinational Logic Analysis 6. Functions of Combinational Logic 7. Latches, Flip-flops, and Timers 8. Shift Registers
13	Main references: Digital Fundamentals, Thomas L. Floyd, Eleventh Edition
14	Additional references: www.pearesonglobaleditions.com

1	Unit name:	Radiation Protection and Radiation Shielding
2	Code:	NE 4013
3	Classification:	Major Subject
4	Credit Value:	3
5	Semester/Year Offered:	2/4
6	Pre-requisite	NE 1011, Introduction to Radiation and Radioactivity
7	Mode of delivery:	Brainstorming, Presentation, Group Discussion, Role play
8	Assessment system and breakdown of marks:	Assignment, Tutorial, Written Exam
	Assignment	15%
	Tutorial	15%
	Written Exam	70%
9	Academic staff teaching unit:	Department of Nuclear Technology
10	Course outcome of unit: After completion of this course, students will be able to 1. Explain the biological effects of ionizing radiation 2. Describe the current exposure limits and radiation protection criteria 3. Explain the external radiation protection 4. Explain the internal dosimetry and radiation protection 5. Determine the shielding of alpha, beta and photon sources 6. Determine the neutron shielding and neutron dosimetry 7. Explain the production of X-ray and X-ray shielding	
11	Synopsis of unit: The course covers the radiation protection and radiation shielding for external and internal radiation hazard. The course includes the direct and indirect biological effects of radiation, radiation protection criteria, exposure limits, methodology and ICRP dosimetric models. And also cover the shielding against alpha, beta, gamma, X-ray and neutron radiation.	
12	Topic: 1. Chemical and Biological Effects of Radiation 2. Radiation Protection Criteria and Exposure Limits 3. External Radiation Protection 4. Internal Dosimetry and Radiation Protection 5. Radiation Shielding 6. Neutrons 7. X-rays	
13	Main References: 1. James E. Turner: *Atoms, Radiation, and Radiation Protection*, 3rd Edition, 2007 2. James E. Martin: *Physics for Radiation Protection*, 2nd Edition, 2006	

14	Additional References: 1. Alan Martin and Samuel A. Harbison: *Introduction to Radiation Protection*, 4th Edition, 2002. 2. Dr. AbdKhalik bin Haji Wood, Dr. Azali bin Muhammad: *Handbook of Radiation Protection*, Malaysian Nuclear Agency (Nuclear Malaysia) Bangi 43000 KAJANG, 2006.

Prepared by;

Dr.Saw Thantar

Professor

No	Information of Introduction to Reactor Engineering	
1	Unit name:	Introduction to Reactor Engineering
2	Code:	NE-4024
3	Classification:	Nuclear Reactor Engineering
4	Credit value:	3
5	Semester/ Year Offered:	2/4
6	Pre-requisite:	NE-3022 Introduction to Nuclear Concepts for Engineers
7	Mode of delivery:	Lecture, Classwork
8	Assessment system and breakdown of marks:	Assignment, tutorial, exam
	Assignment	10%
	Tutorial	20%
	Mid-term	35%
	Exam	35%
9	Academic staff teaching unit:	Department of Nuclear Technology
10	Course outcome of unit: After completion of this course, students will be able to 1. analyze interaction of radiation with matter 2. analyze nuclear fission 3. analyze nuclear reactor types and theory, and cost of nuclear power 4. analyze fundamentals of neutron moderation, which is treated in a simple way by the group diffusion method 5. analyze nuclear properties of moderators, reflector and fuel materials of a reactor	
11	Synopsis of unit: The design of all nuclear systems – reactors, radiation shields, isotopic generators, and so on – depends fundamentally on the way in which nuclear radiation interacts with matter. In this subject, these interactions are discussed for neutrons, r-rays, and various charged particles with energies up to about 20 MeV. Most of the radiation encountered in practical nuclear devices lies in this energy region.This subject includes information on atomic and nuclear physics; neutron characteristics; reactor theory and nuclear parameters; and the theory of reactor operation. This information will provide personnel with a foundation for understanding the scientific principles that are associated with various nuclear reactor facility operations and maintenance.	
12	Topic: 1. Interaction of radiation with matters 2. Nuclear cross-sections 3. Neutron attenuations 4. Neutron flux 5. Neutron cross-section data 6. Nuclear fission 7. Fission Yields and Mass Distribution of Fission Products 8. Energy Release from Nuclear Fission 9. Energy Distribution of Fission Fragments	

	10. Energy Distribution of Fission Neutrons 11. Neutron Yield and Production Ratio 12. Prompt and Delayed Neutrons 13. Liquid Drop Model for Nuclear Fission 14. Spontaneous Fission 15. Nuclear Reactors and Nuclear Power 16. Nuclear Reactor Fuel 17. Non-Nuclear Components of Nuclear Power Plants 18. Components of Nuclear Reactors 19. Power Reactors and Nuclear Reactors 20. Nuclear Cycles 21. Isotope Separation 22. Fuel Reprocessing 23. Radioactive Waste Disposal 24. Reactor Materials 25. Structural and Cladding Materials 26. Moderator and Reflector Materials 27. Fuel Materials
13	Main references: 1. Introduction to Nuclear Engineering, 3rd Edition, John R. Lamarsh and Anthony J. Baratta 2. Elementary Nuclear and Reactor Physics, M.A. Wazed Miah 3. Nuclear Reactor Engineering , Reactor Design Basic,4th Edi, Vol-1, Samuel Glasstone and Alexander Sesonske
14	Additional references:

No	Information of Radiation Detection and Measurement	
1	Unit name:	Radiation Detection and Measurement
2	Code:	NE - 4032
3	Classification:	Major subject
4	Credit value:	2.5
5	Semester/ Year Offered:	2/4
6	Pre-requisite:	NA
7	Mode of delivery:	Lecture, Presentation
8	Assessment system and breakdown of marks:	Tutorial, Assignment and Exam
	Tutorial	20 %
	Assignment	10 %
	Exam	70 %
9	Academic staff teaching unit:	Department of Nuclear Technology
10	Course outcome of unit: After completion of this course, students will be able to 1. To describe the principles, functions and components of a radiation detection system and interaction of radiation with matters. 2. To solve the problems concerning interaction of radiation with matters. 3. To explain the principles and operations of radiation detectors (gas-filled detectors, scintillation detectors and semiconductor detectors).	
11	Synopsis of unit: The first chapter defines the energy range of the different types of radiation for which instruments and methods of measurement are considered; it gives a brief discussion of errors that emphasizes their importance; and, finally, it presents a very general description of the components of a counting system. Chapters 4 constitute a quick review of material. Students need this review of atomic and nuclear physics and of penetration of radiation through matter. In this chapter, relative to the stopping power of charged particles, there is a more detailed discussion and presentation of the latest formulas of gamma-ray build-up factors. Chapters 5 through 7 describe the different types of radiation detectors. Full chapters have been devoted to gas-filled counters, scintillation detectors, and semiconductor detectors.	

12	Topic: 1. Introduction to Radiation Measurements 2. Energy Loss and Penetration of Radiation through Matter 3. Gas-filled Detectors 4. Scintillation Detectors 5. Semiconductor Detectors
13	Main references: Measurement and Detection of Radiation, 2nd Edition, Nicholas Tsoulfanidis.
14	Additional references: Radiation Detection and Measurement, 3rd Edition, Glenn F. Knoll, 1999