No.	Information of Introduction to Nuclear Concept for Engineers	
1.	Unit name:	Introduction to Nuclear Concept for Engineers
2.	Code:	NE-3022
3.	Classification:	Major Subject
4.	Credit Value:	3.5
5.	Semester/ Year Offered:	2/3
6.	Pre-requisite:	NA
7.	Mode of delivery:	Lecture, Class work
8.	Assessment system and breakdown of marks:	Assignment, Tutorial, Examination
	Assignment	10%
	Tutorial	20%
	Examination	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 important of Nuclear Technology 2. Classify the various types of nuclear reactions 3. Discuss neutron interaction reactions 4. Describe the principle radioactive decay modes as specific types of nuclear reaction 5. Classify the important of nuclear fission and fusion reactions 6. Explain the interaction of radiation with matter	
11.	Synopsis of units: In chapter 1, we begin by discussing the role and importance of nuclear science in engineering and the world. Nuclear processes are extremely important in our world today, not just in the electrical power industry, but in many other ways that we have come to rely on. We are reminded so some of the indispensable medical uses of radiation and	

	radioisotopes. The discussion of nuclear processes continues with chapter 2. Here we deal with exclusively with the discussion of nuclear reaction as general phenomena, the specifics of which are covered in later chapters in the context of particular reactions of interest, i.e. scattering decay, capture, fission, etc. In chapter 3, we move to some more specific nuclear reaction problems by considering scattering. Scattering and solving down of neutrons are of paramount importance in nuclear reactors. Elastic neutron scattering leads perfectly to the implementation of the center of mass coordinate system formalism as a tool for describing interaction. Radioactive decay is covered in chapter 4, again, as a specific type of nuclear reaction. The kinematics of radiation modes of primary importance in nuclear energy production and related disciplines are reviewed. The student will find discussion of the nuclear reactions fission and fusion in chapter 5. The properties and energetic of the reaction processes are considered, rather than the engineering detail of practical energy production in a reactor. The latter is better left to nuclear reactor and nuclear engineering design courses. Radiation interaction with matter is covered in chapter 6. Consistent with our collision interaction theme developed earlier, charged particle (Coulomb) collision kinematics are discussed, as this is fundamental to the interaction of charged particles with matter.
12.	Topic: 1. Basic Principles 2. Nuclear Reactions 3. Neutron Interaction 4. Decay of Radionuclides 5. Fission and Fusion 6. Interaction of radiation with matter
13.	Main References: Introduction to nuclear concepts for engineers, Robert M. Mayo
14.	Additional References:

	(1) Physics for radiation protection, 2nd Edition, James E, Martin (2) Atomic and nuclear physics, A.B Gupta, Dipark Ghosh

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No.	Information of Thermal Hydraulics	
1.	Unit name:	Thermal Hydraulics
2.	Code:	NE-3023
3.	Classification:	Major Subject
4.	Credit Value:	3.5
5.	Semester/ Year Offered:	1/3
6.	Pre-requisite:	NA
7.	Mode of delivery:	Lecture, Class work
8.	Assessment system and breakdown of marks:	Assignment, Tutorial, Examination
	Assignment	10%
	Tutorial	20%
	Examination	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. Internalize the meaning of the terminology and physical principles associated with heat transfer. 2. Delineate pertinent transport phenomena for any process or system involving heat transfer. 3. Use requisite inputs for computing heat transfer rates and/or material temperatures. 4. Develop representative models of real processes and systems and draw conclusions concerning process/system design or performance from the attendant analysis. 5. Develop procedures for determining the time dependence of the temperature distribution within a solid during a transient process.	
11.	Synopsis of units: From the study of thermodynamics, you have learned that energy can be transfer by	

	interactions of a system with its surroundings. However, thermodynamics deals with the end states of the process during which an interaction occurs and provides no information concerning the nature of the interaction or the time rate at which it occurs. The purpose of this unit is to extend thermodynamic analysis through the study of the modes of heat transfer and through the development of relations to calculate heat transfer rates.
12.	Topic: 1. Introduction 2. Introduction to Conduction 3. One-Dimensional, Steady-State Conduction 4. Two- Dimensional, Steady-State Conduction 5. Transient Conduction 6. Introduction to Convection 7. External Flow 8. Internal Flow 9. Free Convection
13.	Main References: Fundamentals of Heat and Mass Transfer, Incropera/ De Witt/ Bergman/ Lavine, 7^{th} Ed.
14.	Additional References:

Prepared by

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Assistant Lecturer

No	Information of Electronic Devices and Circuits (Analog)	
1	Unit name:	Electronic Devices and Circuits (Analog)
2	Code:	NE-3031
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 insulators, conductors, semiconductors, n-type and p-type semiconductors 2. calculate and determine forward and reverse voltages and currents for diodes and to analyze the ripple factor for filtered bridge rectifier circuit 3. calculate and determine the maximum and minimum input voltages for zener diode 4. calculate and explain I_B, I_C, I_E, V_{BE}, V_{CE} and V_{CB} in the BJT transistor circuits 5. calculate and determine the Q-point value for IC and VCE for base bias, emitter bias, emitter-feedback bias, collector-feedback bias, and voltage divider bias circuits 6. explain Attenuation, CMRR, Common-Base Amplifier, Common-Emitter Amplifier, Common-Collector Amplifier, Differential Amplifier and determine the dc collector voltage and the ac collector voltage for amplifier circuits 7. derive and determine closed-loop voltage gain, input and output impedances of amplifiers 8. derive and determine mid-range open-loop voltage gain, and attenuation of RC Lag circuit and plot the curve of the phase-shift versus frequency 9. explain bandwidth (BW), phase shift, and slew rate and determine the bandwidths of each of the amplifiers and total phase lag 10. determine the rate of change of output voltages in response to the input waveforms for summing amplifiers, integrators and differentiators	

11	Synopsis of unit: "Electronic devices and circuits (Analog)" subject ensures that many semiconductor devices are based on the pn junction and operation and characteristics of the diode are covered. The first step is to learn about semiconductor transistors' operation, including bipolar junction transistor (BJT) and field-effect transistor (FET). DC biasing is used to establish fixed dc values for the transistor currents and voltages called the dc operating point or quiescent point (Q-point) in order to operate as an amplifier. After all, these materials lay the groundwork for the study of amplifiers, and other circuits that require proper biasing.
12	Topic: 1. Introduction to Electronics 2. Diode Applications 3. Special-Purpose Diodes 4. Bipolar Junction Transistors 5. Transistor Bias Circuits 6. BJT Amplifiers 7. The Operational Amplifier 8. Basic Op-Amp Circuits
13	Main references: Electronic Devices, Electron Flow Version, Ninth Edition, Thomas L. Floyd
14	Additional references: www.pearesonhighered.com