National University of Sciences & Technology (NUST)
School of Electrical Engineering and Computer Science (SEECS)
Department of Electrical Engineering

Basic Electronics

Course Code:	EE-212	**Semester:**	4th
Credit Hours:	2+1	**Prerequisite Codes:**	NIL
Instructor:	Ms. Maira Islam	**Class:**	BESE-5AB
Office:	A-114, SEECS	**Telephone:**	9085-2565
Lecture Days:	Thursday	**E-mail:**	maira.islam@seecs.edu.pk
Class Room:	CR-6,10,15 SEECS	**Consulting Hours:**	Monday, Thursday-11:00-12:00
Lab Engineer:	Farukh Abbas	**Lab Engineer Email:**	farukh.abbas@seecs.edu.pk
Knowledge Group:	Electronics	**Updates on LMS:**	After every lecture

Course Description:

Electricity and Electronics are very broad and diverse fields and almost anything you can think of somehow uses electricity or electronics. The following are some of the major application areas:
Computers, Communications, Automation, Transportation, Medicine and Consumer Electronics.
This course is designed for students with an ultimate career goal that focuses on Software Engineering and Information Technology (IT). There are no technical prerequisites for success in the material presented other than basic math skills and electricity concepts of higher secondary level. The important concepts in basic electronics are thoroughly covered.
The student is provided with a rich blend of theory directly tied to practical laboratory examples which will enable students to see the relevance of the various topics of Software Engineering. One of the primary goals of this course is to communicate simple and basic electronic circuits in an intuitive and logical way. After the course students will be able to understand the basics of circuits and electronics and to analyze the electric and electronics systems.

Course Objectives:

The course objective is that its successful completion should develop understanding of Circuit Theory and its application to Electric Circuits. Further, it should lay down the analyzing and designing techniques for basic electronics circuits

Course Learning Outcomes (CLOs):		
At the end of the course the students will be able to:	**PLO**	**BT Level***
1. Apply basic laws to solve electric circuits and Analyze electronic circuits	2	C-3 C-4
2. Understand, Analyze and design circuits containing Operational Amplifiers	3	C3, C-4, C-5
3. Understand and Analyze Circuits Containing Diodes and Transistors	2	C1, C2, C4
4. Use CAD tool for Circuits simulations	5	P-4
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain		

Mapping of CLOs to Program Learning Outcomes

PLOs/CLOs	CLO1	CLO2	CLO3	CLO4
PLO 1 (Engineering Knowledge)				
PLO 2 (Problem Analysis)	√	√	√	
PLO 3 (Design/Development of Solutions)				
PLO 4 (Investigation)				
PLO 5 (Modern tool usage)				√
PLO 6 (The Engineer and Society)				
PLO 7 (Environment and Sustainability)				
PLO 8 (Ethics)				
PLO 9 (Individual and Team Work)				
PLO 10 (Communication)				
PLO 11 (Project Management)				
PLO 12 (Lifelong Learning)				

Mapping of CLOs to Assessment Modules and Weightages (In accordance with NUST statutes)

To be filled in at the end of the course.

Assessments/CLOs	CLO1	CLO2	CLO3	CLO4	CLO5
Quizzes: 8.5%					
Assignments: 4%					
OHT-1: 12.5%					
OHT-2: 12.5%					
Labs:25%					
End Semester Exam:37.5%					
Total : 100 %					

Books:

Text Book:
1. Fundamentals of Electric Circuits, Fourth Edition, McGRaw Hill. Author: Alexander, Sadiku
2. Electronic Devices and Circuit Theory, 7th Edition, Author: Robert Boylestad

Reference Books:
1. The Art of Electronics by Horowitz

Main Topics to be Covered:

1. Basic Circuit Laws
2. KVL, KCL, Thevenin's Theorem
3. Maximum power transfer
4. Diodes
5. Clippers, Clampers
6. Op-amps
7. BJTs

8. Op-amp applications

Lecture No.	*Topics to be Covered*
1	Introduction to basic concepts
2	Basic Laws Series/ parallel combination of resistors Circuits with Series-Parallel Combinations of Resistors Kirchoff Voltage/ Current Laws
3	Single node pair circuits
4	Basic Circuit Analysis Mesh Analysis
5	Basic Circuit Analysis Nodal Analysis
6	Superposition theorem
7	Thevenin's theorem
8	Norton theorem
9	Maximum Power Transfer Theorem
10	***Problem solving session***
11	Introduction to Semiconductors & semiconductor materials
12	Application of Operational Amplifiers Diode Theory
13	Diode Clippers
14	Diode Clampers
15	Transistors: BJTs
16	Transistors: BJTs
17	BJTs Applications
18	**Problem solving Session**
19	Applications of Operational Amplifiers Summing Amplifier
20	Application of Operational Amplifiers Difference Amplifier Transistors
21	Different OpAmp configurations
22	**Problem solving session**
23	Application of Operational Amplifiers
24	Application of Operational Amplifiers
25	**Problem solving session**
26	Capacitors and Inductors
27	Capacitor and Inductor Combinations
28	Introduction to RLC Circuits
29	***Problem solving session***
30	***Problem solving session***

Lab Experiments:	
1	Introduction To Basic Laboratory Equipment
2	Introduction to PSpice
3	Verification of KVL,KCL, Voltage & Current Divider Rule
4	Introduction To Mesh Analysis
5	Introduction To Nodal Anaylsis
6	Thevenin's/ Norton's Equivalent Circuit
7	Digital Oscilloscope/Function Generator Operation
8	Characteristics & Applications of Diode
9	Applications of Diode
10	Introduction and Applications of BJTs
11	Operational Amplifier
12	RC Circuits
13	RL Circuits
14	RLC Filters
Tools / Software Requirement:	
RF CAD tools such as pSpice and Multisim are required for the lab work.	

Grading Policy:	
Quiz Policy:	The quizzes will be unannounced and normally last for ten minutes. The question framed is to test the concepts involved in last few lectures. Number of quizzes that will be used for evaluation is at the instructor's discretion.
Assignment Policy:	In order to develop comprehensive understanding of the subject, assignments will be given. Late assignments will not be accepted / graded. All assignments will count towards the total (No 'best-of' policy). The students are advised to do the assignment themselves. Copying of assignments is highly discouraged and violations will be dealt with severely by referring any occurrences to the disciplinary committee. The questions in the assignment are meant to be challenging to give students confidence and extensive knowledge about the subject matter and enable them to prepare for the exams.
Lab Conduct:	The labs will be conducted for three hours every week. A lab handout will be given in advance for study and analysis The lab handouts will also be placed on LMS. The students are to submit their results by giving a lab report at the end of lab for evaluation. One lab report per group will be required. However, students will also be evaluated by oral viva during the lab.
Plagiarism:	SEECS maintains a zero tolerance policy towards plagiarism. While collaboration in this course is highly encouraged, you must ensure that you do not claim other people's work/ ideas as your own. Plagiarism occurs when the words, ideas, assertions, theories, figures, images, programming codes of others are presented as your own work. You must cite and acknowledge all sources of information in your assignments. Failing to comply with the SEECS plagiarism policy will lead to strict penalties including zero marks in assignments and referral to the academic coordination office for disciplinary action.