Course Number and Title:	**EE- 111 Linear Circuit Analysis**	
Credit Hours:	3+1	
Pre Requisite	None	
Instructor (s):	**Prof. Dr. Tahir Mahmood and Engr. M. Mansoor Ashraf**	
Lab Engineer:	Engr. M. Wasif Tabassum	
Compulsory/Elective:	Compulsory	
If Elective: Depth Core/ Breadth Core:		
Course Schedule:	Lecture:	3 hours/week
	Lab:	3 hours/week
	Office hours:	3 hours/week
Course Assessment:	Assignments:	4
	Quizzes:	4
	Course project:	-
	Lab work:	14 experiments
	Exams:	Mid-semester and Final
Grading Policy:	Quizzes:	10%
	Assignments:	10%
	Lab work:	20%
	Mid-Semester:	20%
	End-Semester:	40%
Text Book:	**Fundamentals of Electric Circuits**, 4th Edition, Charles K. Alexander, Matthew N. O. Sadiku	
Reference Book(s):	1. **Basic Engineering Circuit Analysis**, 10th Edition, J. David Irwin, Robert M. Nelms 2. **Electric Circuits Fundamentals**, 2nd Edition, Sergio Franco	
Course Objectives:	1. Identify linear systems and represent/model those systems in schematic form 2. Simplify electric systems using series and parallel equivalents and using Thevenin and Norton equivalents 3. Design inverting, non-inverting, summing, difference and cascaded operational amplifier circuits 4. Identify and model first order electric systems involving capacitors and inductors and predict their transient behavior 5. Model the various types of sources and loads for three-phase electric systems	

Course Learning Outcome	CLO Statement	PLO	Bloom
CLO-1:	Knowledge about the fundamentals of basic electrical quantities, circuit terminology, basic circuit laws, and circuit theorems in DC circuits including capacitors and inductors and operational amplifiers.	PLO-1	C1
CLO-2:	Application of basic laws and theorems in AC circuits and first order circuits	PLO-1	C1 C3
CLO-3:	Concepts of three-phase circuits and analysis of common three-phase systems	PLO-1	C1 C3 C4

Topics covered in the course and level of	❖ Basic Concepts	3 hours
	❖ Basic Laws	3 hours

coverage:	❖ Methods of Analysis	6 hours
	❖ Circuit Theorems	12 hours
	❖ Operational Amplifiers	3 hours
	❖ Capacitors and Inductors	3 hours
	❖ First Order Circuits	6 hours
	❖ Sinusoids and Phasors	3 hours
	❖ AC Power Analysis	3 hours
	❖ Three-Phase Circuits	6 hours

	Detailed Contents	CLO	PLO
Program learning outcomes and how they are covered by specific course outcomes:	❖ System of Units, Charge and Current	CLO-1	PLO-1
	❖ Voltage, Power and Energy	CLO-1	PLO-1
	❖ Circuit Elements	CLO-1	PLO-1
	❖ Ohm's Law	CLO-1	PLO-1
	❖ Nodes, Braches and Loops	CLO-1	PLO-1
	❖ Kirchhoff's Laws	CLO-1	PLO-1
	❖ Series Resistors and Voltage Division	CLO-1	PLO-1
	❖ Parallel Resistors and Current Division	CLO-1	PLO-1
	❖ Nodal Analysis	CLO-1	PLO-1
	❖ Nodal Analysis with Voltage Sources	CLO-1	PLO-1
	❖ Mesh Analysis	CLO-1	PLO-1
	❖ Mesh Analysis with Current Sources	CLO-1	PLO-1
	❖ Nodal versus Mesh Analysis	CLO-1	PLO-1
	❖ Linearity Property	CLO-1	PLO-1
	❖ Superposition Theorem	CLO-1	PLO-1
	❖ Source Transformation	CLO-1	PLO-1
	❖ Thevenin's Theorem	CLO-1	PLO-1
	❖ Norton's Theorem	CLO-1	PLO-1
	❖ Operational Amplifiers	CLO-1	PLO-1
	❖ Ideal Op Amp	CLO-1	PLO-1
	❖ Inverting Amplifier	CLO-1	PLO-1
	❖ Non-inverting Amplifier	CLO-1	PLO-1
	❖ Summing Amplifier	CLO-1	PLO-1
	❖ Difference Amplifier	CLO-1	PLO-1
	❖ Capacitors	CLO-1	PLO-1
	❖ Series and Parallel Capacitors	CLO-1	PLO-1
	❖ Inductors	CLO-1	PLO-1
	❖ Series and Parallel Inductors	CLO-1	PLO-1
	❖ The Source-Free RC Circuit	CLO-2	PLO-1
	❖ The Source-Free RL Circuit	CLO-2	PLO-1
	❖ Step Response of an RC Circuit	CLO-2	PLO-1
	❖ Step Response of an RL Circuit	CLO-2	PLO-1
	❖ Sinusoids	CLO-2	PLO-1
	❖ Phasors	CLO-2	PLO-1
	❖ Phasor Relationships for Circuit Elements	CLO-2	PLO-1
	❖ Impedance and Admittance	CLO-2	PLO-1
	❖ Kirchhoff's Laws in Frequency Domain	CLO-2	PLO-1
	❖ Impedance Combinations	CLO-2	PLO-1
	❖ Instantaneous and Average Power	CLO-3	PLO-1
	❖ Effective or RMS value	CLO-3	PLO-1
	❖ Apparent Power and Power Factor	CLO-3	PLO-1
	❖ Complex Power	CLO-3	PLO-1

	❖ Conservation of AC Power		CLO-3	PLO-1
	❖ Balanced Three-Phase Voltages		CLO-3	PLO-1
	❖ Balanced Wye-Wye Connection		CLO-3	PLO-1
	❖ Balanced Wye-Delta Connection		CLO-3	PLO-1
	❖ Balanced Delta-Delta Connection		CLO-3	PLO-1
	❖ Power in a Balanced System		CLO-3	PLO-1

Mapping of CLOs with PLOs and Bloom's Taxonomy Cognitive Levels:

PLO	1	2	3	4	5	6	7	8	9	10	11	12
CLO-1	C1											
CLO-2	C1 C3											
CLO-3	C1 C3 C4											

Mapping of CLOs with Assessment Methods:

CLOs/Assessment	CLO-1	CLO-2	CLO-3
Assignments:	√	√	√
Quizzes:	√	√	√
Lab work:	√	√	√
Mid-Semester:	√		
End-Semester:	√	√	√