Course Number and Title:	EE- 41A1Power System Analysis			
Credit Hours:	3+1			
Pre Requisite	Introduction to Power Engineering			
Instructor:	Prof. Dr. Tahir Nadeem Malik			
Lab Engineer:	Nouman Qamar			
Compulsory/Elective:	Elective			
If Elective: Depth Core/ Breadth Core:				
Course Schedule:	Lecture:	3 hours/week		
	Lab:	3 hours/week		
	Office hours:	6 hours/week		
Course Assessment:	Assignments:	3		
	Quizzes:	3		
	Course project:	0		
	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 Books:	Power System Analysis by Hadi Saadat Mc Graw-Hill International Editions.			
Reference Book:	Power System Analysis by William D.Stevenson Modern Power System Analysis by Turan Gonen			
Course Objective:	This course has been designed to introduce the importance of analyzing various aspects of power system. It covers power flow studies, fault analysis and stability studies. This forms the basis for power system operation, control and protection.			
Course Learning Outcome	CLO Statement		PLO	Bloom
CLO-1:	To learn the basic concepts, modeling and importance of electrical power system in socio- economic development		PLO-1	C1
CLO-2:	To learn the Load Flow, Fault and stability analysis of power system with reference to following: a. To learn the significance, basic concepts and definitions. b. Mathematical Modeling c. Application to small power systems with hand calculation d. Application to IEEE standard test systems using MATLAB and ETAP. e. Application to industrial power system.		PLO-1,2	C1
Major Topics covered in the course and level of coverage:	Modern Power System and its charactestics			3 hours
	Basic Principle and system component modeling			3 hours
	Single line diagram, Reactance diagram and modeling of power system			3 hours
	Per unit system of Calculations			3 hours

	Admittance matrix formulation and power flow equations	6 hours
	Introduction to load flow analysis and its mathematical formulation	3 hours
	Load flow using iterative techniques	9 hours
	Introduction to fault analysis in power system	3 hours
	Balanced fault in power system	3 hours
	Symmetrical components and unbalanced faults	9 hours
	Stability analysis	6 hours
	Use of digital computer for stability studies	3 hours
	Seminar	3 hours

Program learning outcomes and how they are covered by specific course outcomes:	Detailed Contents	CLO	PLO
	Structure & Growth of Electrical Power Systems, One Line Diagram, Impedance & Reactance Diagram, Bus Impedance and Admittance Matrices---Formation, Modifications and Importance.	CLO-1	PLO-1
	Per unit System of calculations.	CLO-1	PLO-1
	Scope of Load Flow in Electrical Power System, Load Flow Problem Formulation	CLO-1	PLO-1
	Gauss Siedel Method	CLO-2	PLO-2
	Newton Raphson Method	CLO-2	PLO-2
	Decoupled load Flow Analysis	CLO-4	PLO-2
	Importance of the Fault Analysis in Electrical Power System, Faults and their Types, Formation of Z-bus	CLO-1	PLO-1
	Methods for Symmetrical Fault Analysis	CLO-1,2	PLO-2
	Unsymmetrical Fault Analysis: Symmetrical Components, Single line to ground faults	CLO-1,2	PLO-1,2
	Double line to ground faults , Line to line faults	CLO-1,2	PLO-1,2
	Three line to ground fault, Fault level	CLO-1,2	PLO-1,2
	Stability Problem --- Scope and Significance, Steady State & Transient Stability	CLO-1,2	PLO-1,2
	Power Flow Relationship for Cylindrical & Salient Pole Machines, Derivation of Swing Equation	CLO-1,2	PLO-1,2
	Equal Area Criterion, Solution of Swing Equation	CLO-1,2	PLO-1,2
	Factors Effecting Stability, Use of Digital Computer Methods for the Stability Studies	CLO-1,2	PLO-1,2
	Seminar	CLO-1	PLO-1,2

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	C2											
CLO-2		C3										

Mapping of CLOs with Assessment Methods:

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