



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Fundamentals of Power System Analysis – ERE313

Academic Year	2025/2026	Semester	Fall
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1. Basic Information

Course Title (according to the bylaw)	Fundamentals of Power System Analysis				
Course Code (according to the bylaw)	ERE313				
Prerequisite:	Electrical Power Engineering – ERE222				
Department/s participating in delivery of the course	Electrical and Renewable Energy Engineering				
Number of credit hours/points of the course (according to the bylaw)	Credit	Contact Hours			
	Hours	Lecture	Tutorial	Practical	Total
	3	2	2	0	4
Course Type	Compulsory - Major Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Fourth Level				
Academic Program	Bachelor of Engineering of Electrical and Renewable Energy				
Faculty/Institute	Faculty of Engineering				
University/Academy	Nahda University				
Name of Course Coordinator	Assoc. Prof. Dr. Mohamed Mokhtar				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview (Brief summary of scientific content)

Symmetrical components: Symmetrical components, Unsymmetrical faults on transmission lines. Synthesis of unsymmetrical phasor diagrams from their symmetrical components, The symmetrical components of unsymmetrical systems, Power in terms of symmetrical components, Positive, negative, and zero phase sequence networks, Unsymmetrical faults: Shunt faults, Series faults, Network matrices: Network topology, System admittance and system impedance matrices, Load flow solutions and control: Load flow equations, The Gauss-Seidal method, Newton-Raphson method and approximations, De-coupling methods, Regulating transformers. Stability analysis (Equal Area Criterion).

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	CLO1	Identify load flow problem in power system
		CLO2	Explain the different types of faults on transmission lines
		CLO3	Carry out power system concepts to solve the electric system stability problems
		CLO4	Practice neatness in power systems design.
B1	Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems	CLO1	Identify load flow problem in power system
		CLO2	Explain the different types of faults on transmission lines
		CLO3	Carry out power system concepts to solve the electric system stability problems
		CLO4	Practice neatness in power systems design.
B2	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design	CLO1	Identify load flow problem in power system
		CLO2	Explain the different types of faults on transmission lines
		CLO3	Carry out power system concepts to solve the electric system stability problems



Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
B4	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application	CLO1	Carry out power system concepts to solve the electric system stability problems
		CLO2	Practice neatness in power systems design.

4. Teaching and Learning Methods

1. Interactive Lectures
2. Self-learning
3. Tutorials
4. Discussion
5. Case study
6. Report and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours				
			Lecture Hours	Tutorial Hours	Practical Hours	Self-learning (Assignments/Project)	Other
1	Per unit system	6	2	2	0	2	-
2	Basic components of electric power systems and regulating transformers	6	2	2	0	2	-
3	Symmetrical components: Symmetrical components	6	2	2	0	2	-
4	Unsymmetrical faults	6	2	2	0	2	-
5	Unsymmetrical phasor diagrams from their symmetrical components	8	2	2	0	2	Quiz 1 (2 Hr)
6	Symmetrical components of unsymmetrical systems	6	2	2	0	2	-
7	Power in terms of symmetrical components	6	2	2	0	2	
8	Midterm Exam						
9	Positive, negative, and zero phase sequence networks	6	2	2	0	2	-



10	Unsymmetrical faults: Shunt faults	8	2	2	0	2	Quiz 2 (2 Hr)
11	Unsymmetrical faults: Series faults	6	2	2	0	2	-
12	Network matrices: Network topology, System admittance and system impedance matrices	6	2	2	0	2	-
13	Load flow solutions and control: Load flow equations	6	2	2	0	2	
14	De-coupling methods ,Regulating transformers	6	2	2	0	2	-
15	Stability analysis (Equal Area Criterion).	6	2	2	0	2	-
16	Final Exam						

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-term written Exam	7	20	20%
2	Final Written Exam	16	40	40%
3	Assignments	4, 11	10	10%
4	Quizzes	5, 10	10	10%
5	Report	12	10	10%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	P.S.R. Murty Power Systems Analysis Elsevier Science Technology ISBN 9780081012345 2nd Edition June 9 2017 P.S.R. Murty Power Systems Analysis Elsevier Science Technology ISBN 9780081012345 2nd Edition June 9 2017
	Other References	Hadi Saadat, Milwaukee School of Engineering, Power System Analysis, McGraw-Hill Companies, USA, 1999.
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
Supportive facilities & equipment for	Devices/Instruments	Lecture hall equipped with Data-Show/Laser Pointer/PC/Laptop/Smart Interactive Screen/White Board.



teaching and learning	Supplies	Printer / Copier/ Library
	Electronic Programs	Management Information System (MIS)
	Skill Labs/ Simulators	Software Packages
	Virtual Labs	Internet Access
	Other (to be mentioned)	

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Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator