



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Computer Application in Electrical Power Systems – ERE173

Academic Year	2025/2026	Semester	Fall
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1. Basic Information

Course Title (according to the bylaw)	Computer Application in Electrical Power Systems				
Course Code (according to the bylaw)	ERE173				
Prerequisite:	Fundamentals of Power System Analysis) – ERE313				
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 Hours	Contact Hours			
		Lecture	Tutorial	Practical	Total
	3	2	2	0	4
Course Type	Elective - Minor Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Fifth 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

Introduction: Power system matrices, Input and transfer matrices, Admittance matrices of the bus bars, Impedance matrices, Circuits representation, Programming, Large system simulation and programming, Short circuit calculations, Power flow studies concepts and methods, Approximate and fast methods, Separation methods, Distribution factors, Transfer methods, Optimal performance, Generation control, Error analysis, simulation of power system components and stability analysis, Application of some computer packages.

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
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions	CLO1	Suggest alternative solutions to compute the new load flow and voltage profile of a power.
		CLO2	Assess reactive power needed by power system to achieve optimum voltage profile.
		CLO3	Deal with professional computer programs for power system modeling and analysis.
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	Define the basic incidence and network matrices of a power system.
		CLO2	Explain how to form the power system matrices and solve the load flow problem.
		CLO3	Define primitive network of a power system solve modern systems applications problems.
		CLO4	Suggest alternative solutions to compute the new load flow and voltage profile of a power.
		CLO5	Assess reactive power needed by power system to achieve optimum voltage profile.
		CLO6	Deal with professional computer programs for power system modeling and analysis.



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
B3	Design and implement: elements, modules, sub-systems or systems in electrical / electronic / digital engineering using technological and professional tools	CLO1	Suggest alternative solutions to compute the new load flow and voltage profile of a power.
		CLO2	Assess reactive power needed by power system to achieve optimum voltage profile.
		CLO3	Deal with professional computer programs for power system modeling and analysis.
D3	Model, analyze, design, implement, test and operate renewable energy systems such as solar photovoltaics, solar thermal, wind, biomass and waste, hydro-tidal and wave, and other renewable energy applications	CLO1	Define the basic incidence and network matrices of a power system.
		CLO2	Explain how to form the power system matrices and solve the load flow problem.
		CLO3	Define primitive network of a power system solve modern systems applications problems.
		CLO4	Suggest alternative solutions to compute the new load flow and voltage profile of a power.
		CLO5	Assess reactive power needed by power system to achieve optimum voltage profile.
		CLO6	Deal with professional computer programs for power system modeling and analysis.

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	Introduction	6	2	2	0	2	-
2	Power system matrices	6	2	2	0	2	-
3	Input transfer matrices	6	2	2	0	2	-
4	Admittance matrices of the bus bars,	6	2	2	0	2	-
5	Impedance matrices, Circuits representation,	8	2	2	0	2	Quiz 1 (2 Hr)
6	Programming, Large system simulation programming	6	2	2	0	2	-
7	Midterm Exam						
8	Short circuit calculations	6	2	2	0	2	-
9	Power flow studies concepts and methods Approximate and fast methods	6	2	2	0	2	-
10	Power flow studies concepts and methods Separation methods	8	2	2	0	2	Quiz 2 (2 Hr)
11	Power flow studies concepts and methods, Distribution factors, Transfer methods,	6	2	2	0	2	-
12	Optimal performance	6	2	2	0	2	-
13	Generation control	6	2	2	0	2	
14	Error analysis	6	2	2	0	2	-
15	simulation of power system components and stability analysis	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	15	15 %
4	Quizzes	5, 10	15	15 %
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
	Other References	Ten, C. W. and Hou, Y., Modern Power System Analysis, CRC Press, 2024
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Lecture hall equipped with Data-Show/Laser Pointer/PC/Laptop/Smart Interactive Screen/White Board.
	Supplies	Printer / Copier/ Library
	Electronic Programs	Management Information System (MIS)
	Skill Labs/ Simulators	Software Packages
	Virtual Labs	Internet Access
	Other (to be mentioned)	Library

Assoc. Prof. Dr. Mohamed Mokhtar
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator