



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Power System Protection – ERE325

Academic Year	2025/2026	Semester	Spring
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1. Basic Information

Course Title (according to the bylaw)	Power System Protection				
Course Code (according to the bylaw)	ERE325				
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	Prof. Dr. Mohamed Mahmoud Samy				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview

Protection Engineering: Introduction, Effects of Short-circuits on power systems. Basic elements of protection gear, Current and potential transformers, Protective relays, Electromechanical and static relays. Switchgear engineering: Circuit breakers, Types, Construction, Performance, and ratings. Different types of electromechanical relays, Types of protection in electrical power systems, Differential protection of power systems, Protection of ring main systems, Protection of parallel feeders. Protection relaying philosophy and fundamental considerations. Transmission line protection, Compensating distance relaying. Rotating machinery protection: Relay protection for AC generators, Loss of field relay protection, Power transformer protection, Relay input sources

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
A10	Acquire and apply new knowledge, and practice self, lifelong and other learning strategies	CLO6	Develop simulation to protect power systems using any ETAP packages
B1	Select, model and analyze electrical power systems applicable to the Electrical Power and Renewable Energy Engineering Program by applying the concepts of: generation, transmission and distribution of electrical power systems.	CLO1	Analyze electrical power systems applicable to the Electrical Power and Renewable Energy Engineering Program by applying the concepts of: generation, transmission and distribution of electrical power systems.
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	CLO2	Analyze the different types of power system Protection



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	CLO3	Analyze performance of different types of circuit breakers, relays
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.	CLO4	Measure the performance of the different types of power system faults
D2	Identify, analyze and evaluate the energy's conversion processes and management techniques;	CLO5	analyze and evaluate the energy's conversion processes and management techniques;

4. Teaching and Learning Methods

1. Interactive Lectures
2. Self-Learning
3. Discussion
4. Tutorials
5. Field Visits

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 to power system components and Effects of Short-circuits on power systems	7	2	2	0	3	-
2	Introduction to power system components and Effects of Short-circuits on power systems	7	2	2	0	3	-
3	Basic elements of protection gear, Current and potential transformers, Protective relays, Electromechanical and static relays.	7	2	2	0	3	-



4	Basic elements of protection gear, Current and potential transformers, Protective relays, Electromechanical and static relays.	7	2	2	0	3	-
5	Switchgear engineering: Circuit breakers, Types, Construction, Performance, and ratings.	9	2	2	0	3	Quiz 1 (2 Hr)
6	Different types of electromechanical relays, Types of protection in electrical power systems, Differential protection of power systems, Protection of ring main systems, Protection of parallel feeders.	7	2	2	0	3	-
7	Mid Term Exam						
8	Different types of electromechanical relays, Types of protection in electrical power systems, Differential protection of power systems, Protection of ring main systems, Protection of parallel feeders.	7	2	2	0	3	-
9	Protection relaying philosophy and fundamental considerations, Transmission line protection and Compensating distance relaying	7	2	2	0	3	-
10	Protection relaying philosophy and fundamental considerations, Transmission line protection and Compensating distance relaying	9	2	2	0	3	Quiz 2 (2 Hr)
11	Rotating machinery protection: Relay protection for AC generators, Loss of field relay protection	7	2	2	0	3	-
12	Power transformer protection, Relay input sources	7	2	2	0	3	-
13	Power transformer protection, and Relay input sources	7	2	2	0	3	-
14	Power transformer protection, and Relay input sources	7	2	2	0	3	-
15	Revision	7	2	2	0	3	-
16	Final Term 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 and attendance	1-15	30	30%
4	Quizzes	5 & 10	10	10%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	Flurschein, C. H., Power Circuit Breaker: Theory and Design, IEE Power Eng. Series, 2018.
	Other References	1) Horwitz, S. H. and Phadke, A. G., Power System Relaying, John Wiley, 2016. 2) Rao. S. S, Switchgear & Protection, Khann Publishers, 2013
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data Show
	Supplies	White Board
	Electronic Programs	MATLAB and ETAP Software Programs
	Skill Labs/ Simulators	–
	Virtual Labs	–
	Other (to be mentioned)	Lecture Hall and Laboratory Usage

Prof. Dr. Mohamed Mahmoud Samy
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator