



**ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM**

Course Title	Course Code
POWER SYSTEMS PROTECTION	151228300

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
8	3	0	5

Course ECTS Credit Distribution				
Basic Sciences	Engineering Sciences	Design	General Education	Social
0	5	0	0	0

Language of Instruction	Course Level	Course Type
English	Undergraduate	Elective

Prerequisite	None
Objectives of the Course	To introduce fundamental knowledge about power system protection. To teach the working principles of different types of relays. To teach how to perform power system protection by using proper types of relays.
Brief Course Content	Principles of Power Systems Protection, System Protection Components, Different Types of Relays, Applications of Relays in Power Systems Protection, Numerical Relaying, System Grounding Principles, Relay Coordination Problem.

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 They will have fundamental knowledge about power systems protection.	1c	1	A
2 They will have fundamental knowledge about relays and their working principles.	1c	1	A
3 They will be able to determine the required relay parameters for power systems protection.	1c, 2	1	A
4 They will be able to ensure coordinated operation of different number of relays in an electrical power system.	1c, 2	1	A
5			

*Teaching Methods 1:Lecture, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Problem Solving, 11:Individual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation

**Assessment Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

Main Textbook	Protective Relaying Principles and Applications , J. Lewis Blackburn & Tomas J. Domin, 4th Ed, CRC Press, 2014
Supplementary Resources	J. Duncan Glover, Mulukutla S. Sarma, Thomas Overbye, Adam Birchfield., Power System Analysis and Design, SI Edition, 7th Edition., Cengage, 2022.
Necessary Course Material	None

Assessment	
Activity Type	%
Mid-term	40
Final Exam	60
Total	100

Course Weekly Schedule	
1	Introduction
2	Power systems protection fundamentals
3	System Protection Components
4	Overcurrent Relays – <i>Bidirectional and Directional Relays,</i>
5	Overcurrent Relays – <i>Impedance Relays, Differential Relays</i>
6	Fundamental Relay Applications
7	Zones of Protection
8	Mid-Term Exams
9	Line Protection with Impedance Relays
10	Bus Protection with Differential Relays
11	Transformer Protection with Differential Relays
12	Pilot Relaying
13	Numerical Relaying
14	System Grounding Principles
15	Relay Coordination Problem
16,17	Final Exams

Calculation of Course Workload			
Activities	Count	Time (Hour)	Total Workload (Hour)
Weekly classroom time	14	3	42
Weekly study time (review, reinforcing, preparation)	14	3	42
Homework			
Taking a quiz			
Studying for a quiz			
Oral exam			
Studying for an oral exam			
Report writing (Preparation and presentation time included)			
Project (Preparation and presentation time included)			
Presentation (Preparation time included)			
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	25	25
Final Exam	1	2	2
Studying for Final Exam	1	25	25
		Total workload	138
		Total workload / 30	4.6
		Course ECTS Credit	5

COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES

(5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)

NO	PROGRAM OUTCOMES	Contribution
1	a. Sufficient knowledge of mathematics	
	b. Sufficient knowledge of basic sciences	
	c. Sufficient basic engineering and Electrical-Electronics engineering knowledge	5
	d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems	
2	Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.	5
3	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	
4	To analyze and solve the complicated engineering problems:	
	a. skill of developing, selecting and applying the required techniques and devices	
	b. skill of using information technologies effectively	
5	To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects:	
	a. skill of experimental design	
	b. skill of performing the experiments, collecting the data and analyzing and interpreting the results	
6	a. Skill of performing individual studies	
	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	
7	a. Skill of effective oral and writing communication in Turkish	
	b. Skill of improving and using foreign language knowledge	
	c. Skill of effective reporting, understanding the reports and preparing the design and production reports	
	d. Skill of effective presentation and giving and getting clear and understandable instructions.	
8	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology	
9	a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities	
	b. Knowledge about legal regulations and standards of engineering	
10	a. Knowledge about project management, risk management and change management	
	b. Awareness of the significance of entrepreneurship and innovation	
	c. Knowledge about sustainable development	
11	Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions	
12	Knowledge about modern problems in local and universal scale	

INSTRUCTORS

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Date: 17.07.2024