



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

Course Title	Course Code
High Voltage Techniques	151228523-151248523

Semester in Program	Number of Course Hours per Week		ECTS
	Theory	Practice	
7	3	0	5

Course ECTS Credit Distribution				
Basic Sciences	Engineering Sciences	Design	General Education	Social
	3			

Language of Instruction	Course Level	Course Type
English	Undergraduate	Elective

Prerequisite	
Objectives of the Course	Students will master: Theory: Breakdown in solids, liquids, and gases, plus corona discharge issues. Testing: High-voltage generation methods and standard test procedures. Phenomena: Lightning and switching surges in power systems. Safety: Critical protocols for high-voltage environments.
Brief Course Content	This course covers the fundamentals of high-voltage engineering, focusing on insulation breakdown theory across solids, liquids, and gases. Students will analyze corona discharges, lightning, and switching phenomena while mastering high-voltage test generation and procedures. Above all, the curriculum emphasizes essential safety protocols for working in high-voltage environments.

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 Learn the application of mathematics, physics, and electric field theory in the electric power system field.	2	Lecture	Exam
2 Learn the breakdown mechanism of gaseous insulators.	2	Lecture	Exam
3 Learn the problems caused by the corona in lines.	4	Lecture	Exam
4 Learn the topology and the basic operating principles of high voltage generators. Also, learn the high voltage measurement techniques	4	Lecture	Exam
5 Understand the lighting phenomenon and its adverse effects and learn the ways of protection against lightning	2	Lecture	Exam
6 Learn the type of protection devices and their characteristics	4	Lecture	Exam

***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	M.S. Naidu and V. Kamaraju, High Voltage Engineering, second edition, NY: McGraw-Hill, 1999.
Supplementary Resources	1) E. Kuffel, W. S. Zaengl, High Voltage Engineering Fundamentals, Elsevier Science & Technology Books, 1999. 2) T. J. Gallagher and A. J. Pearmain, High Voltage Measurement, Testing and Design, NY: Wiley, 1983. 3) L. L. Alston, High Voltage Technology, Oxford University Press, 1968.
Necessary Course Material	

Course Weekly Schedule	
1	Introduction to high voltage techniques
2	Conduction and breakdown of gaseous insulators
3	Corona
4	Conduction and breakdown of liquid and solid insulators
5	Applications of Insulating Materials
6	DC and AC high voltage generators
7	Impulse generators
8	Mid-Term Exams
9	Measurement of High Voltages and Currents
10	Overvoltage Phenomenon, lightning and protection methods against lightning
11	Insulation Coordination in Electric Power Systems
12	Non-Destructive Testing of Materials and Electrical Apparatus
13	Non-Destructive Testing of Materials and Electrical Apparatus
14	High Voltage Testing of Electrical Apparatus and Planning of high voltage laborites
15	High Voltage Testing of Electrical Apparatus and Planning of high voltage laborites
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	6	84
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	8	8
Final Exam	1	2	2
Studying for Final Exam	1	10	10
	Total workload		148
	Total workload / 30		4.9
	Course ECTS Credit		5

Assessment	
Activity Type	%
Mid-term	35
Presentation	15
Homework	
Final Exam	50
Total	100

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	4
	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.	4
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	3
	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	

LECTURER(S)				
Prepared by	Assoc.prof.Dr.Atabak NAJAFI			

Date:24.12.2025