EEE4029 Distribute	d Generation Systems	2+0+0	AKTS:4
Year / Semester	Fall		
Course Level	Undergraduate 4th year		
Compulsory / Elective	Technical elective		
Department	Electrical and Electroni	cs Engineering	
Prerequisite	None		
Education system	Face to face		
Course Duration	14 weeks - 2 hours per	week	
Faculty Member	Prof. Dr. İsmail H. ALT	ΓAŞ	
Alternative Faculty Membe	er None		
Language of Instruction	English		
Internship	None		

OBJECTIVES OF THE COURSE

The students are subject to learn electric power generating systems, centralized and distributed generation of electrical power, wind energy systems, distributed wind energy, Photovoltaic solar energy systems, distributed PV energy systems, Interfacing wind energy systems into distributed generation, interfacing PV energy systems into distributed generation, Small hydro, Battery charging units, micro grids, energy management in distributed generation systems, modelling and simulation of distributed generation.

Learning Outcomes	CTPO	MEM
Upon successful completion of the course, the students will be able to :		
LO - 1 : Electric power generating systems	4	1,5,6
LO - 2 : Centralized and distributed generation of electrical power	4,8	1,5,6,
LO - 3 : Wind, Photovoltaic solar energy systems and Battery units	3	1,5,6,
LO - 4 : Distributed wind, PV systems and Battery charging units	3,4	1,5,6,
LO - 5 : Interfacing wind and PV systems into distributed generation systems	3,4	1,5,6,
LO - 6 : Micro grids and energy management in distributed generation	2,3	1,5,6,
LO - 7 : Modelling and simulation of distributed generation systems.	2,3	1,5,6,

CTPO: Contribution to department program outcomes, MEM: Measurement and evaluation method (1: Written Exam, 2: Oral Exam, 3: Homework, 4: Laboratory Study/Exam, 5: Seminar / Presentation, 6: Term Paper / Project), LO: Learning Outcome.

Contents of the Course

Electric power generating systems, centralized and distributed generation of electrical power, wind energy systems, distributed wind energy, Photovoltaic solar energy systems, distributed PV energy systems, Battery charging units, Interfacing wind energy systems into distributed generation, interfacing PV energy systems into distributed generation, small hydro and other renewables, energy management in distributed generation systems, modelling and simulation of distributed generation.

Teaching Plan

Related notes/ files Week Subject Week 1 Electric power generating systems Week 2 Centralized and distributed generation of electrical power Week 3 Wind energy systems Week 4 Wind energy systems Week 5 Interfacing wind energy systems into distributed generation Week 6 Photovoltaic solar energy systems Week 7 Photovoltaic solar energy systems Week 8 Interfacing PV energy systems into distributed generation Week 9 Midterm exam Week 10 Battery charging units, small hydro and other renewables Week 11 Micro grids Week 12 Energy management in distributed generation systems Week 13 Modelling and simulation of distributed generation. Week 14 Modelling and simulation of distributed generation. Week 15 Project evaluations and student presentations Week 16 **Final exam**

Text Book / Course material

- 1. İsmail H. Altaş, unpublished lecture notes
- İsmail H. Altaş, "Fuzzy Logic Control in Energy Systems with design applications in MATLAB/Simulink", The Institution of Engineering and Technology (The IET) Books, 2017.

Additional resources

- 1. Gharehpetian, G.B., Agah, S.M.M., 2017; Distributed Generation Systems: Design, Operation and Grid Integration, Butterworth-Heinemann
- 2. Bollen, M.H.J., Hassan, F., 2011; Integration of Distributed Generation in the Power System, Wiley-IEEE Press
- 3. Jenkins, N., Ekanayake, J.B., Strbac, G., 2010; Distributed Generation, IET
- 4. Mahmoud, M.S., AL-Sunni, F.M., 2015; Control and Optimization of Distributed Generation Systems, Springer
- 5. Bansal, R., 2017; Handbook of Distributed Generation: Electric Power Technologies, Economics and Environmental Impacts, Springer

Evaluation Method

Method	Week	Date	Duration (Hour)	Contribution (%)	
Midterm	9		2	30	
Presentation	14 - 15		2	10	
Project	15		2	10	
End of term exam	16		2	50	

Student Work Load and its Distribution						
Type of work	Duration (hours pw)	Number of weeks				
Lectures (face to face teaching)	2	14				
extracurricular work	2	10				
Preparation for the Midterm Exam	2	7				
Midterm	2	1				
Homework	1	10				
Project	1	10				
End of term exam	1	5				
Other 1	2	1				
Total Work Load						