AGU Graduate School of Engineering and Science Electrical and Computer Engineering Program



Name Introduction to Electric Drive Systems Hour per week 3 + 0 (Theory + Practice) Credit 3 ECTS 7,5 Level/Year Undergraduate/Graduate Semester Fall Type Elective Location TBB Dype Electrical Machines and Drives Special Conditions N/A Coordinator(s) Dr. Burak Tekgún Webpage N/A Content 1. Basic characteristics of DC machines 2. Single phase, three phase, and DC//DC converter drives 3. Closed loop control of DC machines 4. Induction machine drives 5. Stator and rotor voltage control 7. Voltage and frequency control 8. Current control 9. Closed loop control of DC and Acines 10. Synchronous machine drives 11. Cylindrical and salient pole machines 12. Reluctance motors 13. Peravenous dectronic drives 14.	COURSE RECORD	
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Ethical Rules and	Students are not allowed to collaborate on homework assignments, exams, and
Course Policy	project reports. Project reports will be written and graded individually.

LEARNING ACTIVITIES

Activities	Number	Weight (%)
Lecture	10	60%
Group Works	3	20%
Presentations	10	20%

Total 100

ASSESSMENT

Evaluation Criteria	Weight (%)
MIDTERM EXAM	25%
Homework Assignments	20%
Group Project Assignments & Presentations	20%
Attendance/Participation	05%
Final Exam/Submission	30%
	Total 100%

For a detailed description of grading policy and scale, please refer to the website https://goo.gl/HbPM2y section 28.

COURSE LOAD

Activity	Duration	Quantity	Work Load	
	(hour)		(hour)	
In class activities	3	16	48	
Homework Assignments	5	11	55	
Group work	3	12	36	
Research (web, library)	3	16	48	
Required Readings	5	16	80	
Pre-work for Presentation	8	2	16	

General Sum 283

ECTS: 7,5 (Work Load/25-30)

CONTRIBUTION TO PROGRAMME OUTCOMES*

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	P013	P014
L01	5	3	0	0	0	0	0	2	1	0	0	0	0	0
L02	0	5	4	0	0	0	0	5	1	0	0	0	0	0
L03	0	0	5	0	0	0	0	5	0	0	0	0	0	3
L04	0	0	0	5	0	0	0	5	0	0	0	0	0	3
L05	0	0	0	0	5	5	5	5	0	0	0	0	5	5
L06	0	0	0	0	0	0	0	0	5	5	5	5	5	5

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

WEEKLY SCHEDULE

W	Торіс	Outcomes
1	Introduction and understanding the basic mechanical requirements for	L01
	electric drives and three phase circuits review	
2	Basic characteristics of DC machines and transfer function derivation.	L01, L02
	Single phase and three phase DC machine drives.	
3	DC/DC converter based chopper DC machine drives. Closed loop speed and	LO2, LO3
	torque control of DC machines with speed and current feedback structures.	
4	Introduction to AC drives and performance characteristics of three phase	L04
	induction machines.	

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5	Stator voltage control and rotor voltage control and frequency control of induction machines.	L05
6	Voltage and frequency control, current control and constant slip-speed control of induction machines.	L05
7	Closed loop control of induction machines.	L05
8	Midterm Exam	L01, L02, L03, L04, L05
9	Basic principle of vector control. Direct and quadrature axis transformation	L06
10	Synchronous machine drives for cylindrical rotor, salient pole motors.	L06
11	Reluctance and permanent magnet motors. Closed loop control of synchronous machines	L06
12	Design of speed controller for PMSM drives	L06
13	Variable reluctance and permanent magnet stepper motor control. Linear induction motors and high voltage drives.	L05, L06
14	Final Exam	LO1, LO2, LO3, LO4, LO5, LO6