

# ELECTRICAL MACHINES

<b>1</b>	Course Title:	ELECTRICAL MACHINES	
<b>2</b>	Course Code:	EEM4105	
<b>3</b>	Type of Course:	Optional	
<b>4</b>	Level of Course:	First Cycle	
<b>5</b>	Year of Study:	4	
<b>6</b>	Semester:	7	
<b>7</b>	ECTS Credits Allocated:	4.00	
<b>8</b>	Theoretical (hour/week):	2.00	
<b>9</b>	Practice (hour/week):	0.00	
<b>10</b>	Laboratory (hour/week):	2	
<b>11</b>	Prerequisites:	Yok	
<b>12</b>	Language:	Turkish	
<b>13</b>	Mode of Delivery:	Face to face	
<b>14</b>	Course Coordinator:	Öğr.Gör.Dr. SEVİM KURTULDU	
<b>15</b>	Course Lecturers:		
<b>16</b>	Contact information of the Course Coordinator:	0 224 294 2021 kurtuldu@uludag.edu.tr	
<b>17</b>	Website:		
<b>18</b>	Objective of the Course:	Provide an introduction of the concepts, equivalent-circuit models, analysis techniques and operational characteristics of AC electrical machines.	
<b>19</b>	Contribution of the Course to Professional Development:	Principles of rotating electrical machines, their construction, classification and application areas. Steady-state equivalent-circuit models and operational characteristics. Determination of model parameters of synchronous and induction machines. Generator and motor operation. General knowledge on single-phase alternating current machines.	
<b>20</b>	Learning Outcomes:		
		<b>1</b>	Knowledge on fundamental principles and structures of AC electrical machines.
		<b>2</b>	Ability to identify equivalent-circuit models and operational characteristics of AC electrical machines.
		<b>3</b>	Ability to analyze steady-state behavior of AC electrical machines.
		<b>4</b>	Ability to conduct experiments and to collect, analyze and interpret data intended for understanding operation of AC machines.
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<b>21</b>	Course Content:		
		<b>Course Content:</b>	
Week	Theoretical	Practice	
<b>1</b>	Principles of AC machines.	Introduction.	

2	Rotational magnetic field. Synchronous speed.	Project Announcement.
3	Synchronous machines: structure, working principle and the equivalent circuit model.	Registration.
4	Synchronous machines: operational characteristics.	Safety Instructions
5	Synchronous machines: steady-state analysis.	Characteristics of synchronous machines.
6	Synchronous machines: power flow, losses and efficiency.	Characteristics of synchronous machines.
7	Induction machines: structure, working principle and the equivalent circuit model.	No-load and block rotor tests on squirrel cage induction motor.
8	Three phase induction motor: operational characteristics.	Three phase induction motors (Start-delta functionality)
9	Three phase induction motor: steady-state analysis.	Star-delta starter for squirrel cage induction motor.
10	Three phase induction motor: power flow, losses and efficiency.	Rotor resistance starter for slip ring induction motor.
11	Single phase induction motors: structures, working principle and the equivalent circuit model.	Capacitor-Run Motor induction Motor.
12	Single phase induction motors: Starting techniques and operational characteristics.	Capacitor-start induction motor.
13	Single phase induction motors: Application examples.	Project-Interview.
14	Review.	Project-Interview.
22	Textbooks, References and/or Other Materials:	<p>1. "Electric Machinery", A. E. Fitzgerald, Jr., Charles Kingsley, Stephen D. Umans, Electric, 5th ed. New York, NY: McGraw-Hill, 1992. ISBN: 0070707708-3.</p> <p>2. "Elektrik Makinelerinin Temelleri", Stephen J.Chapman (çev.). , Palme Yayınevi, 2020.</p> <p>3. "Dynamic Simulations of Electric Machinery : Using MATLAB/SIMULINK", Chee Mun-Ong,2006.</p>
23	Assesment	
<b>TERM LEARNING ACTIVITIES</b>		
	<b>NUMBE R</b>	<b>WEIGHT</b>
Midterm Exam	1	20.00
Quiz	0	0.00
Home work-project	1	20.00
Final Exam	1	60.00
Total	3	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		Measurement and evaluation are performed according to the Rules & Regulations of Bursa Uludağ University on Undergraduate Education.
24	<b>ECTS / WORK LOAD TABLE</b>	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	14	2.00	28.00
Self study and preperation	14	3.00	42.00
Homeworks	1	25.00	25.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	1.00	1.00
Others	0	0.00	0.00
Final Exams	1	1.00	1.00
Total Work Load			125.00
Total work load/ 30 hr			4.17
ECTS Credit of the Course			4.00

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
<b>LO: Learning Objectives PQ: Program Qualifications</b>																
<b>Contribution Level:</b>	<b>1 very low</b>			<b>2 low</b>			<b>3 Medium</b>			<b>4 High</b>			<b>5 Very High</b>			