

	<b>EE469 BLDC MOTOR CONTROLLERS</b>				<b>Department:</b> Electric and Electronic Engineering		<b>Semester</b>	
								8
	<b>Methods of Education</b>							<b>ECTS</b>
	<b>Lecture</b>	<b>Recitation</b>	<b>Lab</b>	<b>Project (F. Study)</b>	<b>Homework</b>	<b>Others</b>	<b>Total</b>	
	30	20	-		30	20	100	
								5
<b>Language</b>	English							
<b>Course Status</b>	Elective							
<b>Prerequisites</b>	None							
<b>Course Contents</b>	DC motor operation Model of DC motors Operating modes in DC motor drives Electronically - commutated DC motor drives Power converters for DC motor drives Phase controlled DC motor drives Chopper controlled DC motor drives Designing feedback controllers for motor drives Control objective Control structure Control design Example of a controller design							
<b>Course Objectives</b>	Electrical drives play an important part as electromechanical energy converters in transportation, materials handling and most production processes. The objectives of this subject are to enable students to: acquire an understanding of the nature of BLDC(Brushless DC) motors and their control techniques. The course tries to give unified treatment of complete electrical drive systems, including the mechanical parts, electrical machines, and power converters and control.							
<b>Learning Outcomes and Competences</b>	By the end of the course, students will be able to: <ol style="list-style-type: none"> <li>1) Understand the design of a brushless DC (BLDC) motor and how a brushless DC motor works</li> <li>2) Identify and explain the essential principles of operation and construction of a range of BLDC electrical machines</li> <li>3) Analyse and understand control the speed of a BLDC motor and BLDC drive's control systems;</li> <li>4) Understand the BLDC drive control system works.</li> <li>5) To be familiar with power converters and code generation</li> <li>6) To be familiar with BLDC drive system experiment and system implementation</li> </ol>							
<b>Textbook and /or References</b>	1) "Electric Motor Drives, Modeling, Analysis and Control" by R. Krishnan, published by Prentice Hall, 2001.							
<b>Assessment Criteria</b>	<b>Assessment Items</b>			<b>If any, mark as (X)</b>		<b>Percentage (%)</b>		
	Midterm Exams			X		30		
	Quizzes			X		15		
	Homeworks			X		10		
	Projects			X		15		
	Term Paper			X				
	Laboratory work							
	Other							
Final Exam			X		30			
<b>Instructor</b>	Assoc. Prof. Dr. Sinan KIVRAK							
<b>Week</b>	<b>Subject</b>							
1	Introduction to common applications of BLDC motors							
2	Introduction to design and function of BLDC motors							
3	Experimental investigation of how BLDC motors work							
4	Advantages and disadvantages of BLDC motors							

5	Introduction to various circuits for controlling BLDC motors: square and sine-wave current signals
6	Measurement and analysis of circuits
7	Introduction to various methods of detecting rotor position: Hall sensors, back-emf, pole detection, resolvers and incremental sensors
8	Measurement of position using Hall sensors
9	<b>Midterm Exam</b>
10	Introduction to current and speed control of BLDC motors
11	Experimental investigation of speed control
12	Setting parameters for speed control
13	Implementation of BLDC driver Term Project
14	Implementation of BLDC driver Term Project
15	Implementation of BLDC driver Term Project