



**University of Tehran**  
**School of Electrical and Computer Engineering**

<b>Course:</b>	<b>Power Electronics 2</b>		
<b>Course type:</b>	Main Course for Power Electronics and Electric Machines branch	EE*	Credit: 3
<b>Level:</b>	Graduate		
<b>Co-requisite(s):</b>			
<b>Prerequisite(s):</b>	Power Electronics I		
<b>Prerequisite by topic:</b>	Basic knowledge of industrial electronics, electrical machines and control		
<b>Textbook(s):</b>	[1] W. Leonhard, "Control of Electrical Drives," Springer, 3rd Edition, 2001 [2] D. Schroeder, "Elektrische Antriebe 1," Springer, 1994. [3] D. Novotny, T. Lipo, "Vector Control and Dynamics o AC Drives," Clarendon, 1996.		
<b>Coordinator:</b>	Shahrokh Farhangi		
<b>Goals:</b>	Become familiar with the following topics: <ol style="list-style-type: none"> <li>1. Drive and load dynamics</li> <li>2. Losses and thermal model of electric machine</li> <li>3. Model of separately excited DC machine</li> <li>4. Closed loop control of separately excited DC machine</li> <li>5. Asynchronous machine modeling and rotor/stator flux orientation principles</li> <li>6. Power electronics convertors for AC drives</li> <li>7. Scalar and vector control of asynchronous machine</li> <li>8. Doubly fed induction machine control</li> </ol>		
<b>Outcome:</b>	Students who pass the course successfully will be able to <ol style="list-style-type: none"> <li>1. Choose proper machine ratings with respect to load condition.</li> <li>2. Analyze thermal behavior of machine and determine allowable overload</li> <li>3. Investigate machine behavior in different operating modes and consider parameters variations.</li> <li>4. Optimal design of cascaded controller for separately excited DC machine</li> <li>5. Design open loop controller for asynchronous machine</li> <li>6. Design scalar and vector control for asynchronous machine</li> </ol>		

	7. Analyze doubly fed induction machine and design controller for it.										
<b>Topics:</b>	<ul style="list-style-type: none"> <li>1- Introduction to electric drives</li> <li>2- Thermal Effects in Electrical Machines</li> <li>3- Separately Excited DC Machine</li> <li>4- Control of Converter Supplied DC Drives</li> <li>5- Symmetrical Three Phase AC Machines</li> <li>6- Power Supplies for Adjustable Speed AC Drives</li> <li>7- Control of Induction Motor Drives</li> <li>8- Induction Motor Drive with Reduced Speed Range</li> </ul>										
<b>Computer usage:</b>	Running simulations by Matlab/Simulink										
<b>Assignments:</b>	Six assignments										
<b>Projects:</b>	Two projects										
<b>Grading:</b>	<table style="width: 100%; border: none;"> <tr> <td>Exercises</td> <td style="text-align: right;">6%</td> </tr> <tr> <td>First project</td> <td style="text-align: right;">8%</td> </tr> <tr> <td>Final project</td> <td style="text-align: right;">14%</td> </tr> <tr> <td>Midterm</td> <td style="text-align: right;">34%</td> </tr> <tr> <td>Final exam</td> <td style="text-align: right;">38%</td> </tr> </table>	Exercises	6%	First project	8%	Final project	14%	Midterm	34%	Final exam	38%
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<b>Further readings:</b>	Selected papers and tutorials										
<b>Prepared by:</b>	Shahrokh Farhangi										
<b>Date:</b>	November 1, 2017										

\*EE: Electrical Engineering CE: Computer Engineering IT: Information Technology