

## Modelling and Analysis of Energy Systems

<b>Module title</b>	Modelling and Analysis of Energy Systems			<b>Module-Code</b>	TBD
<b>Duration</b>	1 semester	<b>Semester</b>	Fall/Spring Semester	<b>Module-Start</b>	1,2,3
<b>Credit points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module coordinator</b>	TBD			<b>Language</b>	English
<b>Syllabus</b>	<ul style="list-style-type: none"> <li>• Dynamic state of electrical power systems</li> <li>• Methods and models for analysis of the dynamics, stability and control of an electric power system</li> <li>• The electricity market</li> <li>• Connection of intermittent (renewable) sources to the grid</li> <li>• Voltage, frequency and small signal stability</li> <li>• Accessibility and vulnerability</li> </ul>				
<b>Learning outcomes</b>	<p>On successful completion of this module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• analyse the power system critically and the grid structure from an overall perspective, including vulnerability;</li> <li>• perform calculations on connected complex electrical power networks with multiple sources and loads in terms of stability, losses and load flows under stationary conditions;</li> <li>• account for connection of distributed and new renewable sources to the grid, perform error analysis for both symmetric and unsymmetric conditions;</li> <li>• account for different regulatory principles, compensation principles and equipment;</li> <li>• Explain dynamic states and instability in power systems using mathematical models for analysis of dynamic events and stability;</li> <li>• analyze the impact of various technical solutions for damping network drifts and stabilization</li> </ul>				
<b>Literature</b>	<ol style="list-style-type: none"> <li>1. Glover, J. Duncan; Sarma, Mulukutla S.; Overbye, Thomas J., Power Systems Analysis and Design, (Thomson, 2008)</li> <li>2. Schavemaker, Pieter; Van der Sluis, Lou, Electrical Power System Essentials, (Wiley, 2008)</li> </ol>				
<b>Form of teaching</b>	Lecture (2UoI) Recitation (2UoI)				
<b>Assessment methods</b>	Individual report + oral presentation				
<b>Associated study program</b>	<i>M.Sc. in Resources and Technology</i>				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the module				

**Grading system**

The final grade is based on the individual report (70 %) and the oral presentation (30 %)