

## Components and Systems for Electromobility 2021

*Part I: 22 November, 12.00 – 26 Nov 2021, 15.00, Söderköping*

### Preliminary Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
8-10		<b>Electric drives II (T2)</b> <ul style="list-style-type: none"> <li>• Power Electronics components</li> <li>• Fundamental converter types</li> <li>• Modulation and control</li> <li>• Cost estimates</li> </ul>	<b>Batteries (T3)</b> <ul style="list-style-type: none"> <li>• Li-ion battery and beyond</li> <li>• Battery ageing</li> <li>• Testing and safety</li> </ul>	<b>Environmental Assessment of Electromobility (T4)</b> <ul style="list-style-type: none"> <li>• Life-cycle perspective</li> <li>• Environmental impact of electrification</li> </ul>	<b>Interaction between vehicles and the power grid (T5)</b>
10-12		<b>Practical exercise Electric drives (T2)</b> <ul style="list-style-type: none"> <li>• Mod. of 2Q converter</li> <li>• Switching freq. assessment</li> <li>• 1phase – 3 phase extension</li> </ul> Harmonic injection	<b>Tools for system studies (T1)</b> <ul style="list-style-type: none"> <li>• Tutorial on tools for vehicle propulsion system design and optimal control</li> </ul> Practical session with computer exercises (Simulink)	<b>Environmental Assessment of Electromobility (T4)</b> <ul style="list-style-type: none"> <li>• Calculation exercise</li> <li>• Circular economy of electric drivetrain components</li> </ul>	<b>Interaction between vehicles and the power grid (T5)</b>
12-13	<b>Welcome lunch</b>	<b>Lunch</b>	<b>Lunch</b>	<b>Lunch</b>	<b>Lunch</b>
13-15	<b>Introduction</b> Course introduction. <ul style="list-style-type: none"> <li>• Why electromobility?</li> <li>• What are your expectations?</li> </ul> <b>** Panel discussion**</b> <ul style="list-style-type: none"> <li>• Basic hybrid concepts and systems.</li> <li>• Driving cycles</li> </ul>	<b>Batteries and Fuel Cells (T3)</b> <ul style="list-style-type: none"> <li>• Basic principles</li> <li>• Different battery and fuel cell technologies</li> </ul>	<b>System analysis and Optimization (T1)</b> <ul style="list-style-type: none"> <li>• Modelling and Simulation</li> <li>• The control problem for hybrid and electric vehicles</li> <li>• Optimization and how it can be used to analyse vehicle propulsion systems</li> </ul>	<b>Environmental Assessment of Electromobility (T4)</b> <ul style="list-style-type: none"> <li>• Impact of electrification in logistics</li> <li>• User patterns for driving and charging EVs</li> </ul>	<b>Home assignment</b> <ul style="list-style-type: none"> <li>• Introduction to home assignment</li> </ul> Create project groups  <b>Summary and feedback</b>
15-17	<b>Electric drives I (T2)</b> <ul style="list-style-type: none"> <li>• Fundamental physics and torque generation</li> <li>• Losses &amp; cooling</li> <li>• Electrical machine topologies</li> </ul> Control of electrical machines	<b>Tutorial Battery modelling (T3)</b> <ul style="list-style-type: none"> <li>• Modelling of Li-ion batteries</li> <li>• Battery optimization</li> </ul>	<b>Tools for system studies (T1)</b> Tutorial on tools for vehicle propulsion system design and optimal control	<b>Interaction between vehicles and the power grid (T5)</b>	
17-19	<b>17-19 Intro group activity</b>  <b>19.00 Barbeque</b>	<b>17 – 19 Group activity</b>  <b>19.00 Dinner</b>	<b>19.00 Dinner and evening activities</b>  <b>20.00 Group activity</b>	<b>19.00 Farwell Dinner</b>	

*Part II: XX January 2022, 8 – 12??*

**Examination: Final presentations of projects.**