

<b>Module name / title</b>	<b>Fuel Cells and Batteries</b>
<b>Type of module</b>	<b>compulsory-elective</b>
Competencies gained Learning Outcome	<p><b>Specialist competency (knowledge and understanding)</b> The students are able to...</p> <ul style="list-style-type: none"> <li>name basic concepts of fuel cells and batteries.</li> </ul> <p><b>Methodological competency (use, application and generation of knowledge)</b> The students are able to select an adequate type of fuel cell or battery according to a given setting</p> <ul style="list-style-type: none"> <li>by consideration of the properties of the device as well as its advantages and disadvantages in relation to the technical environment.</li> </ul> <p><b>Social competency (communication and cooperation)</b> The students are able to...</p> <ul style="list-style-type: none"> <li>work autonomously on a task within a team and present it in the group.</li> </ul> <p><b>Self-competency (scientific self-image, professionalism)</b> The students are able to...</p> <ul style="list-style-type: none"> <li>develop their own point of view and present it to the group.</li> <li>specify their own strong points and weak points in relation to their studies.</li> <li>balance their strong points and weak points in relation to their studies.</li> </ul>
Content of the module	<ul style="list-style-type: none"> <li>Fundamentals of Energy Converters</li> <li>Thermodynamics (excerpts) in context of Fuel Cells and Batteries</li> <li>Efficiencies and Voltage-Current-Characteristics</li> <li>Battery Types</li> <li>Types of Fuel Cells</li> </ul>
Learning and teaching types / methods / media types	seminar-like teaching, e-learning, self-studies, group work PPT-presentations, lecture notes, exercises
Language	English
Module prerequisites Requirements for participation (previous knowledge)	Recommended: <ul style="list-style-type: none"> <li>Basic knowledge of chemistry</li> </ul>
Applicability of the module	The module finds application in context with energy storage, respectively energy conversion of wind energy (module: Wind Energy) or solar energy (module: Solar Energy – PV Systems).
Requirements for the award of credit points	Regular examination type for module testing: portfolio exam (graded = PL) Further possible examination types: oral exam, written exam

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(Study and exam requirements)	The examination type to be used is announced by the responsible lecturer at the start of the course-, as well as the information of the students about parts and grading of the portfolio exam.
Workload / Credits	2,5 CP / 2 SHW In-class lecture: 2 SHW x 18 weeks = 36 h Self-study: 75 h – 36 h = 39 h
Duration of the module semester / frequency	One semester / summer semester / every other semester
Literature	<ul style="list-style-type: none"> <li>• Larminie, Dicks: Fuel Cell Systems Explained, Wiley</li> <li>• Kordesch, Simader: Fuel Cells and Their Applications, VCH-Verlag</li> <li>• Hoogers: Fuel Cell Technology Handbook, CRC Press</li> <li>• Kiehne: Battery Technology Handbook, CRC Press</li> <li>• Stolten, Scherer: Transition to Renewable Energy Systems, Wiley-VCH</li> </ul>