

Module name / title	Fuel Cells and Batteries
Type of module	compulsory-elective
Competencies gained Learning Outcome	<p>Specialist competency (knowledge and understanding) The students are able to....</p> <ul style="list-style-type: none"> name basic concepts of fuel cells and batteries. <p>Methodological competency (use, application and generation of knowledge) 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"> by consideration of the properties of the device as well as its advantages and disadvantages in relation to the technical environment. <p>Social competency (communication and cooperation) The students are able to....</p> <ul style="list-style-type: none"> work autonomously on a task within a team and present it in the group. <p>Self-competency (scientific self-image, professionalism) The students are able to...</p> <ul style="list-style-type: none"> develop their own point of view and present it to the group. specify their own strong points and weak points in relation to their studies. balance their strong points and weak points in relation to their studies.
Content of the module	<ul style="list-style-type: none"> Fundamentals of Energy Converters Thermodynamics (excerpts) in context of Fuel Cells and Batteries Efficiencies and Voltage-Current-Characteristics Battery Types Types of Fuel Cells
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)	<p>Recommended:</p> <ul style="list-style-type: none"> Basic knowledge of chemistry
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	<p>Regular examination type for module testing: written exam (graded = PL)</p> <p>Further possible examination types: oral exam, portfolio exam</p>

Module manual M.Sc. Wirtschaftsingenieurwesen

(Study and exam requirements)	The examination type to be used is announced by the responsible lecturer at the start of the course.
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">• Larminie, Dicks: Fuel Cell Systems Explained, Wiley• Kordesch, Simader: Fuel Cells and Their Applications, VCH-Verlag• Hoogers: Fuel Cell Technology Handbook, CRC Press• Kiehne: Battery Technology Handbook, CRC Press• Stolten, Scherer: Transition to Renewable Energy Systems, Wiley-VCH