

Course title	<i>Renewable Energy Storage</i>
Course code	<i>IP 409</i>
Module coordinator	<i>Miriam Heinrich</i>
Lecturer	<i>Prof. Dr. Pinkwart</i>
Level of course	<i>Bachelor or Master</i>
Recommended prerequisites	<i>Technical study background is of advantage.</i>
Type of course	<i>Lecture</i>
Weekly lecture hours (SWS)	<i>2 SWS</i>
ECTS credits	<i>2 ECTS</i>
Workload	<i>in total 60 h, 30 h course attendance, 30 h self-study</i>
Assessment (grading; pass/fail)	<i>graded</i>
Regular cycle	<i>Each semester</i>
Language of instruction	<i>English</i>
Contents:	<p><i>Do you want to learn how storage of renewable energy works and why it will become more and more important in future? The course gives an overview of different possibilities to store renewable energy. The energy storage technologies range from pumped hydro storage over flywheels to batteries, supercaps or hydrogen storage. You should bring a technical background for this course, have energy basic knowledge and interest in renewable energy and energy storage. The course is a mixture of theory, technical and economical calculations, homework exercises and some group work activities.</i></p> <p><i>Contents:</i></p> <ol style="list-style-type: none"> <i>1. Global renewables status</i> <i>2. Renewable energy (solar, wind),</i> <i>3. Mechanical storage (pumped hydro, CAES, fly wheel)</i> <i>4. Electrical storage (SMES, super caps),</i> <i>5. Electrochemical storage (lead acid batteries, lithium batteries, redox flow batteries, hydrogen and fuel cells)</i> <i>6. Comparison, economics and global view on storage</i>
Learning outcome (competencies):	<p><i>After having successfully completed the course, the students should</i></p> <ul style="list-style-type: none"> <i>• have an overview of different options to store renewable energy, know how technologies work, their characteristics, advantages, drawbacks and costs</i> <i>• know the function, characteristics and costs of solar PV and wind energy</i> <i>• have an overview of existing global energy storage plants</i> <i>• know how to calculate the cost over lifetime of a battery LCOE</i> <i>• be able to judge, which kind of energy storage fits to which application</i>
Teaching methods	<input checked="" type="checkbox"/> <i>Lecture</i> <input type="checkbox"/> <i>Group work</i> <input type="checkbox"/> <i>Exercises</i> <input type="checkbox"/> <i>Simulation</i> <input type="checkbox"/> <i>Video feedback</i> <input checked="" type="checkbox"/> <i>Others: Excursion</i>
Assessment methods	<i>Written exam</i>

Recommended reading	
Additional information	
Recognition of credits	