Module level Master	Creditpoints 6	Language English	Return annual
Module designation Energy Storage			
Course Energy Storage			
Code	**Subtitle**		
Person responsible for the module	Prof. Dr. rer. nat. Clemens Hoffmann		
Lecturer	Prof. Dr.-Ing. Ingo Stadler		
Workload	180h 820h contact time, 20h Online presentation, 80h private study, 60h exercises, homework)		
Relation to curriculum	Specialist studies, Electrical Systems Technology, elective		
Type of teaching, contact hours	virtual classrooms, online presentation, digital communication		
Requirements according to examination regulations	None		
Recommended prerequisites Modules of Basic studies			

Module objective / intended learning outcomes

- Students know the requirement of energy storage within energy systems
- Students are able to distinguish energy storage needs in different energy systems
- Students are familiar with theories behind storage technologies on different time levels and system integration levels
- Students are able to compare energy storages according to the system needs and economic viability

Content

- History of energy storage and future storage needs
- Energy storage in different time frames
- Energy Storage in advance of electricity generation
  - Conventional primary energy storages as coal, natural gas and uranium
  - Different forms of biomass
- Electrical energy storage
  - Stored and pumped stored hydro power
  - Compressed air power
  - Battery technologies
  - Electrical energy storages (capacitors and coils)
  - Fly wheels
  - Hydrogen and from hydrogen derived chemical storages
  - Alternative concepts
  - Energy storage after usage of electricity (Demand Response und DSM)
  - Heat storage in general
  - Storage heating
  - Buildings as heat storages
  - Heat storage in combination with CHP
  - Heat storage in combination with heat pumps
  - Cold storages in general
  - Cooling houses, freezers and refrigerators
  - Icestorage
  - Communication technologies for Demand Response
- Economy of energy storages

• Legal framework of energy storages	
Study and examination requirements and forms of examination	Written exam (90min)
Media employed	online script
Reading list Reading list will be provided by lecturer via Moodle online platform.	