<table>
<thead>
<tr>
<th>Module level</th>
<th>Creditpoints</th>
<th>Language</th>
<th>Return annual</th>
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<tbody>
<tr>
<td>Master</td>
<td>6</td>
<td>English</td>
<td>annual</td>
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**Module designation**

**Energy Storage**

**Course**

**Energy Storage**

<table>
<thead>
<tr>
<th>Code</th>
<th>Subtitle</th>
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**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

<table>
<thead>
<tr>
<th>Study and examination requirements and forms of examination</th>
<th>Written exam (90min)</th>
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<tbody>
<tr>
<td>Media employed</td>
<td>online script</td>
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Reading list

Reading list will be provided by lecturer via Moodle online platform.