Module title		SM Code
Energy Storage		**ENS**
Module lecturer	**Faculty**	
Prof. Dr. Michael Sterner	Electrical Engineering and Information Technology	
Module language	**Number of SWS / WSH**	**ETCS credits**
English	4 SWS / WSH	5
Teaching format		
Seminar-based teaching with approx. 10-20% exercises		

Semester according to the study plan	
7th semester (Bachelor)	
Attendance/classroom hours	**Additional independent study**
60 hours	Preparation and follow-up work: 60 hours Exam preparation: 30 hours
Type of examination / Requirements for the award of the credit points	
Written exam: 90 minutes	

Teaching content

- Energy Storage
- Definition and classification of energy storage systems
- Storage requirements in electricity supply
- Storage requirements in heat supply
- Storage requirements in the transport sector
- Electrical energy storage
- Electrochemical energy storage
- Chemical energy storage

- Mechanical energy storage
- Thermal energy storage
- Load management as energy storage
- Comparison of storage systems
- Storage integration in individual energy sectors
- Storage integration for coupling different energy sectors

Learning objective: Professional competence

After successfully completing this module, students will be able to

- understand the definition and efficiency calculations of energy storage systems (1) and apply them (3)
- understand the current debate surrounding the need for storage systems (1)
- analyze the properties of the most important energy storage (3) and work out how they can be integrated into energy systems (2)
- calculate the most important technical and economic storage sizes (2)
- design energy storage systems for various applications (3)
- assess and analyze the potential, sizes, and classifications of energy storage systems in relation to each other (3)
- understand the integration options for energy storage systems in sector coupling (1)

Learning objective: Personal competence

After successfully completing this module, students will be able to

- organize and work in a team (2)
- ask technical questions (3) and describe technical contexts using correct technical terminology (3)
- conduct critical discussions in a professional atmosphere (2)
- deal constructively with different views and criticisms (3)
- assess the importance of careful, independent work for their learning success (3)
- recognize the difference between understanding and merely applying solutions, and utilize the advantages of both approaches (3)

- know the principles of good scientific practice (1)
- engage with scientific literature (2)

Literature

Recommended reading

- Sterner, M., & Stadler, I. (2017). *Energiespeicher - Bedarf, Technologien, Integration*. Springer
- Jossen, A., & Weydanz, W. (2006). *Moderne Akkumulatoren richtig einsetzen*. Reichardt Verlag

The numbers in brackets indicate the levels to be achieved: (1)-know | (2)-can | (3)-understand and apply