

Tárgytematika / Course Description

Controlled storage devices

AJNM_BMTA026

Tárgyfelelős neve /

Teacher's name: dr. Tóth-Nagy Csaba

Félév / Semester: 2019/20/1

Beszámolási forma /

Assesment: Vizsga

Tárgy heti óraszám /

Teaching hours(week): 2/1/0

Tárgy féléves óraszám /

Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The goal of the subject is to provide a comprehensive overview on the state-of-the art energy storage technology with a view on system approach including control of the units. Quantitative relationships: physical and mathematical models will also be described so that the students be able to solve numerical problems. A particular attention will be paid to up-to-date controlled storage problems of electrical vehicles. A further relevant goal is to look into the future, so promising development trends will also be presented.

TANTÁRGY TARTALMA / DESCRIPTION

Topics of lectures:

- 1.week Driving forces of distributed energy generation and energy storage. Centralized and distributed energy generation.
- 2.week Needs and requirements with respect to energy storage. Principles and devices of electrical energy storage.
- 3.week Parameters and characteristics of electrical energy storage devices and systems. Energy storage state-of-the-art.
- 4.week Environmental aspects. Large scale energy storage.
- 5.week Role of hydrogen in energy storage.
- 6.week Challenges, requirements of electrical vehicles regarding electrical energy storage. Aspects of device/system selection.
- 7.week Driving cycles, calculation of energy need for electrical vehicles.
- 8.week MidTerm Exam
- 9.week Properties and characteristics of batteries.
- 10.week SoH and lifetime of batteries.
- 11.week Properties and characteristics of supercaps and flywheel systems.
- 12.week Fundamentals of power electronics. Control of storage systems.
- 13.week Fundamentals of design of storage devices and systems.
- 14.week Prospects and future trends of electrical energy storage.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESSMENT'S METHOD

During the semester the obligation is to pass one midterm exam. Midterm Exam is scheduled for the 8th semester week. Exam contains two theoretical questions and one example for maximum ten points per each. Pass level is minimum 12 points. The exam is an oral type. The final mark is composed as follows: 75% for the

oral exam and 25% for the midterm exam.

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Obligatory literature:

Dr István Vajda: Electrical Energy Storage, elektronikus jegyzet

Selected bibliography:

Abbas A. Akhil, et al., DOE/EPRI 2013 Electricity Storage Handbook in Collaboration with NRECA, SANDIA REPORT SAND2013-5131 Unlimited Release July 201.166 pp + App A-G
