

Module Description, available in: EN

Electrical Energy Systems

General Information

Number of ECTS Credits

3

Module code

TSM_EIEnSys

Valid for academic year

2019-2020

Last modification

2018-11-05

Responsible of module

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Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Berne	Lausanne	Lugano	Zurich
Instruction	X E 100%			
Documentation	X E 100%			
Examination	X E 100%			

Module Category

TSM Technical/scientific specialization module

Lessons

2 lecture periods and 1 tutorial period per week

Entry level competences

Prerequisites, previous knowledge

Basics of electrical laws, circuitries, components and energy conversion expected

Brief course description of module objectives and content

In this module, students will increase their knowledge in selected areas of energy production, energy distribution and energy utilization in the systemic environment. Emphasis is placed on modern topics of electrical energy, such as grid quality, energy storages, smart-grids or the European super-grid.

The content consists of 4 parts:

- energy basics and market
- storages and smart-grids
- special chapters on TD (transmission and distribution)
- interconnected grids

Aims, content, methods

Learning objectives and acquired competencies

Students

- know the main challenges of today's modern grids
- know the main elements of an electrical grid and the differences of transmission components
- know the DC transmission technology
- know the worldwide importance of primary energies as regards the electricity market;
- can explain the market pressure by suppliers of fossil primary energy;
- know obstacles for the market entrance of renewable energies;
- know the significance and the possibilities of energy storages and are able to name at least two pro and two contras of each storage type in specific applications;
- know fundamental points in the integration of accumulators and supercapacitors;
- can describe the significance of smart-grids and there interaction with energy storages
- know who frequency stability can be reached and what errors can arise in the network and know how to protect the equipment;
- learn the basic principles of the management and regulation of electrical grids;
- learn to assess the dynamic stability of networks and know quality attributes of grids.

Contents of module with emphasis on teaching content

3	Special Chapters on T&D (Transmission and Distribution) Cables and overhead lines: visibility versus costs and efforts Synchronous machines are the heart of the grid Power Quality phenomena: Standards and the application in the grids,	7 - 9

Teaching and learning methods

- ex cathedra teaching
- weekly exercises
- presentation and discussion of case studies

Literature

Information on additional literature will occasionally be given during the module.

Assessment

Certification requirements

Module uses certification requirements

Certification requirements for final examinations (conditions for attestation)

1 online revision test towards the end of the module has to be done and accepted for admission to the final examination (only admission condition but not part of the final grading).

Basic principle for exams

As a rule, all the standard final exams for modules and also all repetition exams are to be in written form

Standard final exam for a module and written repetition exam

Kind of exam

written

Duration of exam

120 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

calculator

Other permissible aids

Hardcopy form: 2 A4 double-sided pages summary are permitted

Special case: Repetition exam as oral exam

Kind of exam

oral

Duration of exam

30 minutes

Permissible aids

No aids permitted