Course description

Department/Unit /	KEE / MR			**Academic Year**	2018/2019	
Title	Measur., Reg. and Contr. of El. Networks			**Type of completion**	Exam	
Accredited/Credits	Yes, 4 Cred.			**Type of completion**	Combined	
Number of hours	Lecture 2 [Hours/Week] Tutorial 2 [Hours/Week]					
Occ/max	Status A	Status B	Status C	**Course credit prior to**	YES	
Summer semester	0 / -	18 / -	0 / -	**Counted into average**	YES	
Winter semester	29 / -	0 / -	0 / -	**Min. (B+C) students**	10	
Timetable	Yes			**Repeated registration**	NO	
Language of instruction	Czech, English			**Semester taught**	Winter, Summer	
Optional course	Yes			**Internship duration**	0	
Evaluation scale	1|2|3|4			**Ev. sc. – cred.**	S|N	
No. of hours of on-premise						
Auto acc. of credit	Yes in the case of a previous evaluation 4 nebo nic.					
Periodicity	K					
Substituted course	None					
Preclusive courses	N/A					
Prerequisite courses	N/A					
Informally recommended courses	N/A					
Courses depending on this Course	N/A					

Course objectives:

To understand physical patterns in electrical network (EN). To define problems of control and regulation in EN. To evaluate regulation of active power and frequency as well as regulation of reactive power and voltage. To determine principles of cooperation in interconnection EN. To evaluate control EN in crises states and determinate basic of dispatching control.

Requirements on student

Credit: Active participation in laboratory measurements and making over the reports of he performed measurements
Exam: To prove mastering of the EN control and regulation problems - written part (computational problem - by the written test form)

Content

The subject involves the problems of the control, regulation frequency and active power, and regulation voltage and reactive power in EN. The subject deals with operation conditions in interconnection EN, with the respect on exchange power. Next, the subject deals with control EN in crises states a dispatching principle.
1. Introduction to the subject, EN definition and parametrs, EN in CZ
2. Regulation proces in EN, connwction betwen production and consumption
3. Evaluation of the regulation proceses in EN, quality of the regulation proces, regulator types
4. Regulation on the consumption side
5. Basic of the frequency regulation in ES, primary regulation, secondary regulation, teritary regulation.
6. Frequency regulation in interconnected EN. Derivation of solidarity and non-intervention
7. Frequency regulation in crises states
8. EN crises states evaluation
9. Voltage regulation in ES
10. Reactive power compensation
11. Equipments for voltage regulation
12. Primary, secondary and teritary voltage regulation in EN
13. Dispatching control in EN

The industrial experts take part on the lecture in the course.

Fields of study

Guarantors and lecturers

- **Guarantors:** Doc. Ing. Emil Dvorský, CSc. (100%)
- **Lecturer:** Doc. Ing. Emil Dvorský, CSc. (100%)
- **Tutorial lecturer:** Doc. Ing. Emil Dvorský, CSc. (100%), Ing. Lenka Raková, Ph.D. (100%)

Literature

- **Recommended:** Havlíček, Karel. *Řízení, regulace a měření elektrizačních soustav. I. část*. 1. vyd. Plzeň : VŠSE, 1985.
- **Recommended:** Havlíček, Karel. *Řízení, regulace a měření elektrizačních soustav. II. část*. 1. vyd. Plzeň : VŠSE, 1985.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Preparation for laboratory testing; outcome analysis (1-8)	4
Contact hours	52
Presentation preparation (report) (1-10)	12
Preparation for an examination (30-60)	30
Attendance on a field trip (number of real hours - maximum 8h/day)	8
Total:	**106**

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

Combined exam

Continuous assessment

prerequisite

Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:

Knowledge of the problems on graduate level of Electrical Power Engineering 1 subject, which is taught at the Department of Electrical Power Engineering and Ecology of the Faculty of Electrical Engineering, University of West Bohemia in Pilsen.

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

Lecture

Laboratory work

Field trip

learning outcomes

Knowledge - knowledge resulting from the course:

The graduate of the subject will be announced with the problems of the control and regulation in electrical network. They will be able to make regulation of frequency and active power, and voltage and reactive power as well. Students take experiences

with operation of interconnected electric network and with despatching control.

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Electrical Engineering and Informatics	Postgraduate Master	Full-time	Electrical Power Engineering	1	16	2018	Povinné předměty 2.ročníku oboru EE	A	2	ZS
Electrical Engineering and Informatics	Postgraduate Master	Full-time	Electrical Power Engineering	1	16	2018	Povinné předměty 2.ročníku oboru EE	A	2	ZS
Electrical Engineering and Informatics	Postgraduate Master	Full-time	Nuclear Power Engineering	1	12	2018	Povinné předměty 2. ročníku oboru JE	A	2	ZS
Applied Electrical Engineering	Postgraduate Master	Full-time	Applied Electrical Engineering	1	12	2018	5. oborový blok povinně volit. předmětů oboru AE (označení AE5)	B	2	ZS
Applied Electrical Engineering	Postgraduate Master	Combined	Applied Electrical Engineering	1	16	2018	blok AEk3	B	2	LS