COURSE DESCRIPTION CARD - SYLLABUS

Course name
The work of electric power system

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
Networks and power system protections

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Faculty of Environmental Engineering and
Energy

Piotrowo Street 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student possesses basic knowledge of the theory of electrical circuits, electromagnetic field, electrical machines, high voltage techniques, electric power engineering and electrical power generation. Has effective self-study ability in the domain of the chosen field of studies, is able to integrate the knowledge acquired at the credited courses. Is aware of the need to develop his knowledge and competencies, is ready to undertake the cooperation and team work.

Course objective

Getting knowledge of the electric power system operation under transient operating conditions, electric power system stability investigations under both the small disturbances and the instantaneous high

disturbances in the active power balance. Stability enhancement means. Practical service of the programs in the scope of transient states analysis for low and large disturbance as well as during system failures.

Course-related learning outcomes

Knowledge

1. Has knowledge of development trends, new achievements and problems of modern engineering, in particular related to electrical power engineering.

2. Has in-depth knowledge of the construction and operation of the power system and equipment included in it, economic and legal issues related to the generation, distribution and processing of electricity.

3. Has expanded knowledge in the field of creating optimization and decision algorithms used in power engineering.

Skills

1. Can make a critical analysis of complex electrical systems using appropriate engineering tools.

2. Is able to design elements and complex electrical devices and systems, taking into account given non-technical criteria (utility and economic), if necessary adapting existing or developing new methods, techniques and computer tools to support the design of power systems and devices.

Social competences

1. Is aware of the need to constantly develop professional achievements and comply with the principles of professional ethics, fulfill social obligations, inspire and organize activities for the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

1.Assesment of the knowledge and skills shown at the written and oral examinations,

2.Continuous assessment during courses (bonus for activity and perception quality).

Laboratory:

1. Test of the knowledge necessary to deal with problems posed in the lab tasks.

2. Assessment of the knowledge and skills related to the lab task completion,

3. Assessment of the task report

Programme content

Lectures:

Transient states in electric power system: types of states, system disturbances. Scope of the transient states' study and analysis. Models of the System elements for the transient analysis needs. Electric power system stability. Small swing of the generators' rotor - local angle stability. Power-angle characteristics- application of the I Lapunov rule. Influence of the voltage regulation on local stability. Stability under the large instantaneous disturbance of the active power balance - global angle stability. Application of the indirect Lapunov rule. Voltage stability - voltage stability conditions. Stability enhancement means.

Laboratory:

involves experiments carried out using the DAKAR program, in the scope of steady states and of the transient states of in the transmission and distribution networks of the electric power system described during lectures

Teaching methods

Lecture: the theory of the closely related to practice, Multimedia lecture

Laboratory: Computational experiments, working in a team

Bibliography

Basic

1. Machowski J. : Stany nieustalone i stabilność systemu elektroenergetycznego. WNT, Warszawa, 1989.

2. Machowski J.: Regulacja i stabilność systemu elektroenergetycznego. OWPW, Warszawa 2007.

3. Machowski J., Białek J., Bumby J. Power System Dynamics: Stability and Control. IEEE Wiley, 2008.

4. Poradnik Inżyniera Elektryka . t.3. WNT, Warszawa 2005

Additional

1. Z. Kremens, M. Sobierajski: Analiza systemów elektroenergetycznych. WNT, Warszawa, 1996.

2. Zb. Jasicki : Elektromechaniczne stany przejściowe w systemach energetycznych. T.1 i 2. PWN, Warszawa, 1987

3. Kacejko P., Machowski J.:Zwarcia w systemach elektroenergetycznych . WNT, Warszawa, 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for the exam, preparation of reports) [1]	40	2,0

[1] delete or add other activities as appropriate