COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electrical Power Engineering

Course

Field of study

Electrical Engineering

Year/Semester

1/1

Area of study (specialization)

-

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

30

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

dr inż. Justyna Michalak

email:justyna.michalak@put.poznan.pl

tel.616652030

Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

dr inż. Krzysztof Szubert

email: Krzysztof.Szubert@put.poznan.pl

tel. 616652282

Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3A, 60-965 Poznań

Prerequisites

He has knowledge of the basics of electrical engineering and power engineering. It has a basic knowledge of automation in power engineering. It has a basic knowledge of the transmission and distribution of electricity. Can pre-evaluate devices included in the power system. Is aware of the need to expand their competence. Able to work and interact in group.

Course objective

Understanding the basic principles of computing power networks in normal and disturbance conditions. Knowledge of modern energy technologies.

Course-related learning outcomes

Knowledge

1. He has knowledge of the structure of the power system and its component elements

2. He has knowledge about the high-tech power systems and about the devices which are elements of the production, transmission and distribution of electricity

3. Has knowledge of the analysis of the fundamental states of the system, the nature of local and global stability as well as a basic knowledge about the design of power lines

Skills

1. Able to evaluate harmful events associated with the transmission and distribution of electricity

2. Can analyze the production and transmission of electricity

3. Can perform simple calculations for normal and fault conditions of the power system, determine the power and energy losses

Social competences

1. Is aware of the role of the reliability of the power system for the public

2. Is aware of the responsibility for jointly implemented tasks

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

- assessment of the knowledge and skills listed on the written exam,

- continuous assessment for all classes (rewarding activity and quality perception).

Laboratory

- test and favoring knowledge necessary for the accomplishment of problems, continuous evaluation for each course - rewarding gain skills they met the principles and methods, assessment of knowledge and skills related to the implementation of laboratory exercises, the evaluation report on the performed exercise,

- get extra points for the activity in the classroom, and in particular for: propose to discuss further aspects of the subject, the effectiveness of the application of the knowledge gained during solving the given problem, ability to work within a team practice performing the task detailed in the laboratory, subsequent to the improvement of teaching materials, developed aesthetic diligence reports and tasks in the self-study

Programme content

Lecture

Systems and their configurations. Basic analysis and regulation of the power system. Distribution of power in the network hub. The issue of local and global stability. Practical methods for calculating power and energy losses. General information about the design of overhead lines. Harmful events associated with the transmission and distribution of energy. Electrochemical corrosion of underground metal devices. Modern power generation technologies, including: supercritical power plants and fluidized bed boilers, gas-fired and gassteam power plants integrated with fuel gasification technology. Clean coal technologies in power generation: CO2 capture, combustion in pure oxygen. Modern nuclear power plants. Economic and environmental aspects of new technologies. Adjusting the frequency and power exchange, primary, secondary and tertiary regulation. Organization regulations and requirements placed on it. Regulatory processes, the principle of non-intervention in the regulation of secondary. Reactive power compensation in HV and LV networks, batteries, capacitors, FACTS devices, the role of wind farms.

Laboratory

Discussion of the equipment of own needs of conventional power plants and basic measuring devices.

Discussion of short-circuit issues, short-circuit calculations, including: determination of impedance for symmetrical components for cable lines, determination of substitute diagrams of transformers for symmetrical components and testing of ground faults in medium voltage networks.

Testing of electrical equipment using a thermal imaging camera.

Teaching methods

Lecture with multimedia presentation

Laboratory: performing laboratory exercises on stands in the hall

Bibliography

Basic

1. Kujszczyk Sz. (pod red.), Elektroenergetyczne układy przesyłowe, WNT, Warszawa, 1997

2. Kujszczyk Sz. (pod red.), Elektroenergetyczne sieci rozdzielcze, WNT, Warszawa, 2004

3. Adamska J., Niewiedział R., Podstawy elektroenergetyki. Sieci i urządzenia elektroenergetyczne. Skrypt P.P., Nr 1519, Poznań 1989

4. Handke A., Sieci elektroenergetyczne. Szkodliwe zjawiska towarzyszące przesyłaniu i rozdzielaniu energii elektrycznej. Wydawnictwo Politechniki Poznańskiej, Poznań 1987

5. Kulczycki J. (pod red.), Straty energii elektrycznej w sieciach dystrybucyjnych. PTPiREE Poznań 2009

6. PN-EN 50341-3-22 Elektroenergetyczne linie napowietrzne prądu przemiennego powyżej 45 kV. Normatywne warunki krajowe dla Polski. 2009

7. Kubowski J., Nowoczesne elektrownie jądrowe. WNT. Warszawa 2010

8. Skorek J., Kalina J., Gazowe układy kogeneracyjne, WNT, 2005

9. Sikorski W., Szymocha K., Urządzenia pomocnicze elektrowni parowych, Wydawnictwo Politechniki Wrocławskiej, 1981.

10. Chmielniak T., Technologie energetyczne, Wydawnictwo Politechniki Śląskiej, 2004

11. Nehrebecki L., Elektrownie cieplne, WNT, 1974

12. Laudyn D., Pawlik M., Strzelczyk F., Elektrownie, WNT, 2005

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

Additional

1. Celiński Z., Strupczewski A., Podstawy energetyki jądrowej, WNT, 1984

2. Popczyk J., Elektroenergetyczne układy przesyłowe, Wydawnictwo Politechniki Śląskiej, Gliwice 1984
3. Poradnik inżyniera elektryka, WNT, Warszawa 2009

4. Chmielniak T., Ziębik A., Obiegi cieplne nadkrytycznych bloków węglowych. Wydawnictwo Politechniki Śląskiej. 2010

5. Kotowicz J., Elektrownie gazowo-parowe, Kaprint, 2008

6. Szczerbowski, R.(red), Energetyka węglowa i jądrowa: wybrane aspekty /Fundacja na rzecz Czystej Energii, 2017

Breakdown of average student's workload

	Hours	ECTS
Total workload	132	5,0
Classes requiring direct contact with the teacher	72	3,0
Student's own work (literature studies, preparation for laboratory classes, preparation for exam) [1]	60	2,0

[1] delete or add other activities as appropriate