COURSE DESCRIPTION CARD - SYLLABUS

Course name

Control and operation of the power systemo

Course

Field of study

Electrical Engineering

Year/Semester

3/7

Area of study (specialization)

Power Systems and Electric Power Protection

Profile of study

practical

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

15

Projects/seminars

30

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

dr inż. Bartosz Ceran

email: bartosz.ceran@put.poznan.pl

tel.616652523

The Faculty of Environmental Engineering and Energy

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

mgr inż. Krzysztof Łowczowski

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The Faculty of Environmental Engineering and Energy

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Prerequisites

Student has basic knowledge of energy technologies and machines used in the power industry, mechanics, fluid mechanics, basics of metrology. Understands the principles of operation of basic machine parts and knows the construction of basic conventional energy devices: steam boilers, gas and steam turbines, recuperators and heat regenerators, compressors and fans. Student has knowledge of the basics of power engineering. Student is aware of the need to expand their competences, readiness to cooperate within a team.

Course objective

Acquainting with the issues of controlling elements of the power system and principles of operation of power equipment of the power plant in various operating states.

Course-related learning outcomes

Knowledge

1. Student has basic knowledge of the basics of automation and automatic control.

2. Student has theoretically founded knowledge of the power system, including the structure and working states of the manufacturing and transmission sectors.

Skills

1.Student is able to develop project documentation of an engineering task.

2. Student is able to use power equipment in accordance with the technical documentation.

Social competences

1. Student is aware of the impact of energy technologies and machines on the natural environment and understands the need to counteract these phenomena.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

- evaluation of the knowledge and skills listed on the written test,

Tutorials

- credit on the basis of the current check messages and one written tests of the accounting tasks,

Projects

- assessment of knowledge and skills related to the implementation of the project task, assessment of the completed project.

Programme content

Lecture

Opertion of the steam power block in steady and transient states. External and internal disturbances in the operation of the power unit. Regulation of the power generated by the power block. regulation of parameters of fresh steam, water level in the drum, combustion process. Calculation of active and reactive power flows in the power system. Voltage and frequency regulation issues and short-circuit calculations in transmission networks.

Tutorials

Calculations of power unit operational indicators in various operating states.

Short-circuit calculations in transmission networks.

Projects

Design task - modeling and analysis of power block operation states in the power system. Modeling of transmission network working conditions.

Teaching methods

Lecture

- lecture with multimedia presentation supplemented with examples given on the board.

Tutorials

Tasks counted on the board.

Computational problems solved using engineering tools.

Projects

Independent solution of the problem of a project.

Bibliography

Basic

1. Portacha J., Układy cieplne elektrowni i elektrociepłowni konwencjonalnych jądrowych i odnawialnych, Oficyna Wydawnicza Politechniki Warszawskiej, 2016.

2. Paska J., Rozproszone źródła energii, Oficyna Wydawnicza Politechniki Warszawskiej, 2017.

3. Kowalska A., Wilczyński A., Źródła rozproszone w systemie elektroenergetycznym. Kaprint. 2007

4. Matla R., Gładyś H., Praca elektrowni w systemie elektroenergetycznym. WNT. 1999

5. Paska J., Wytwarzanie rozproszone energii elektrycznej i ciepła. Oficyna Wydawnicza Politechniki Warszawskiej. 2010

6. Paska J., Podstawy elektroenergetyki: metody wytwarzania energii, Ofic. Wydaw.PW,, 1994.

7. Paska J., Ocena niezawodności podsystemu wytwórczego systemu elektroenergetycznego, Oficyna Wydawnicza Politechniki Warszawskiej, 2002.

8. Lubośny Z., Elektrownie wiatrowe w systemie elektroenergetycznym, Wydawnictwa Naukowo-Techniczne, 2007.

9. Lubośny Z., Farmy wiatrowe w systemie elektroenergetycznym, Wydawnictwa Naukowo-Techniczne, 2013.

10. Popławski T, Teoria i praktyka planowania rozwoju i eksploatacji systemów elektroenergetycznych : wybrane aspekty, Wydawnictwo Politechniki Częstochowskiej, 2013.

11. Krajowa Agencja Poszanowania Energii, Efektywność energetyczna i odnawialne źródła energii w gminie, Krajowa Agencja Poszanowania Energii, 2004.

12. Lewandowski W., Proekologiczne odnawialne źródła energii, Wydawnictwa Naukowo-Techniczne, 2013.

13. Klugmann-Radziemska E., Odnawialne źródła energii : przykłady obliczeniowe, Wydawnictwo Politechniki Gdańskiej, 2016.

14. Lewandowski W., Klugmann-Radziemska E., Proekologiczne odnawialne źródła energii : kompendium, Wydawnictwo Naukowe PWN, 2017.

Additional

1. Michałowski S., Plutecki J., Energetyka wodna. WNT. 1975

2. Janiczek R.S.: Eksploatacja elektrowni parowych, WNT, 1992.

3. Szkutnik J., Perspektywy i kierunki rozwoju systemu elektroenergetycznego, W.P.Cz. 2011

4. Dołęga W., Planowanie rozwoju sieciowej infrastruktury elektroenergetycznej w aspekcie bezpieczeństwa dostaw energii i bezpieczeństwa ekologicznego, Oficyna wydawnicza Politechniki Wrocławskiej, 2013

5. Popczyk J., Elektroenergetyczne układy przesyłowe, Wydawnictwo Politechniki Śląskiej, Gliwice 1984

6. Mokrzycki E., Gawlik L., (red. nauk.) Rozproszone zasoby energii w systemie elektroenergetycznym, Wydawnictwo IGSMiE PAN, 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	35	1,0

[1] delete or add other activities as appropriate