COURSE DESCRIPTION CARD - SYLLABUS

Course name
Nuclear power plant in the power system [N1Energ1>EJwSE]

Course

Field of study
Power Engineering

Year/Semester
5/9

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
20

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

The student has structured knowledge in the field of power engineering, operation of power plants and knows the principles of the power system. Has the ability to solve differential equations, knows the integral calculus and has knowledge of thermodynamics, fluid mechanics and nuclear physics. Is aware of the need to expand competences, readiness to cooperate within a team.

Course objective

Understanding the basic types of nuclear reactors. Familiarization with their construction, concept and thermal systems. Addressing issues related to the security of nuclear power plants. Understanding development trends in nuclear energy.

Course-related learning outcomes

Knowledge:
1. understands the essence of phenomena occurring in nuclear reactors and the technological process implemented in nuclear power plants, understands the impact of energy transformation processes occurring in nuclear power plants on the natural environment.
2. knows and understands the principle of cooperation between nuclear power units and the power

system.
3. understands civilization dilemmas and knows the basic economic, legal and environmental conditions related to the development of nuclear energy. knows the construction of a nuclear reactor and is able to perform basic calculations of criticality conditions for an energy reactor.

Skills:
1. student is able to perform basic calculations of the criticality conditions of a nuclear power reactor and calculate the mass flow of the coolant necessary to receive heat generated in the core. knows approximate methods for solving neutron balance equations.
2. based on the parameters of the nuclear reactor, the student is able to design a thernak cycle of the power plant.
3. the student is able to analyze the principle of operation of active and passive safety systems in nuclear power plants and assess the effects of possible failures of a nuclear power plant on the environment.
4. can determine the legitimacy of the application of a given nuclear technology used in a particular branch of the economy.

Social competences:
1. is aware of the great responsibility of a power engineering engineer at a nuclear power plant for making decisions. understands the need for continuous training and raising competences in the field of nuclear energy. the student is ready to critically assess his knowledge and to provide the public with reliable information and opinions on nuclear energy, presenting different points of view.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:Assessment of knowledge and skills takes place at the written colloquium on the 13th lecture. The colloquium consists of 10 open questions, with various points. The minimum passing threshold is 51%.
Laboratory: continuous evaluation, on each course - rewarding skills gain in the range of use of the principles and methods have met during the course, assessment of knowledge and skills related to the implementation of the exercise, the assessment of the report from performed exercise.

Programme content

Lecture:
The state of development of nuclear energy in the world. Classification of nuclear reactors. Generations of energy nuclear reactors. Basic thermal schemes of nuclear power plants. Thermodynamic cycles of nuclear power plants. Losses and efficiency. Operation of nuclear power plants. Organization and maintenance of reception. Auxiliary devices and systems. Problems of nuclear power security - the importance of nuclear power plant safety and the security of all nuclear power. Development trends in nuclear energy.
Laboratory:
Characteristics of freshwater reactors. Parameters of nuclear blocks. Elements of the reactor control and protection system. Regulating cassette and boric acid systems.

Teaching methods

Lecture with multimedia presentation with additional examples given on the board.

Bibliography

Basic
1. Celiński Z., Strupczewski A., Podstawy energetyki jądrowej, WNT, Warszawa 1984
2. Kiełkiewicz M., Jądrowe reaktory energetyczne, WNT, Warszawa 1978
3. Kubowski J., Nowoczesne elektrownie jądrowe, WNT, Warszawa 2010
4. Celiński Z., Energetyka jądrowa, PWN, Warszawa 1991
5. Kubowski J., Elektrownie jądrowe, WNT, 2014
Additional
1. Ackermann G., Eksploatacja elektrowni jądrowych, WNT, Warszawa 1987

2. Gałdyś H., Matla R., Praca elektrowni w systemie elektroenergetycznym, WNT, Warszwa 1990
3. Glasstone S., Podstawy techniki reaktorów jądrowych, WNT, Warszawa 1958
4. Kiełkiewicz M., Teoria reaktorów jądrowych, WNT, Warszawa 1987
5. Kiełkiewicz M., Podstawy fizyki reaktorów jądrowych. Cz. 1, Wydawnictwa Politechniki Warszawskiej, Warszawa 1977
6. Kiełkiewicz M., Podstawy fizyki reaktorów jądrowych. Cz. 2, Wydawnictwa Politechniki Warszawskiej, Warszawa 1980
7. Jezierski G., Energia jądrowa wczoraj i dziś, WNT, Warszawa 2005

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00