COURSE DESCRIPTION CARD - SYLLABUS

Course name
Construction of nuclear reactos [S2EJ1>KRJ]

Course

Field of study
Nuclear Power Engineering

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

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

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of nuclear physics. Basic knowledge of thermodynamics. Basic information on machines and equipment of nuclear power plants. Knowledge of the structure and principles of operation of energy devices - pumps, steam turbines, etc. Basic knowledge of heat transfer. Basic knowledge of energy technologies and machines used in the professional energy industry.

Course objective

Acquiring basic knowledge of the construction and principles of operation of nuclear power reactors. Knowledge of the basic types of nuclear reactors PWR, BWR, HWR.

Course-related learning outcomes

Knowledge:
1. Student knows the structure and understands the operation of the basic types of nuclear reactors used in the energy industry.
2. Student has knowledge of the design features and operational properties of nuclear reactors.
3. Student has knowledge about subsequent generations of nuclear reactors.
4. Student knows and understands the safety principles of nuclear power reactors.

Skills:
1.Student is able to present the basic types of power reactors in modern nuclear power plants.
2. Student is able to discuss the design features of reactors and their operational properties and indicate development trends in the construction of nuclear energy reactors.

Social competences:
1. Student is aware of the importance and understands the non-technical aspects and effects of nuclear energy activities, including its impact on the environment.
2. Student understands the need to systematically deepen and expand his knowledge and skills.
3. Student is able to convey to the public the advantages and disadvantages of nuclear energy and reactor operation.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures
Written exam on the date given at the beginning of the semester. The list of questions is made available to students at the beginning of the semester. In doubtful cases, the exam is extended with an oral part. Students' activity is assessed during each lecture. The condition for passing the exam is to obtain at least 50% of the maximum number of points.
Laboratory classes
Continuous assessment in each class (rewarding activity). Completing classes by completing a report.

Programme content

Lectures
History and development of nuclear reactors. Classification and review of the design of selected nuclear power reactors of generation II and III/III+. Construction, principle of operation, operating parameters of power reactors. Pressure water reactors. Boiling reactors. High temperature reactors. The 4th generation reactors. Heating reactors. Auxiliary systems used in the construction of nuclear power reactors.
Laboratory classes
Modeling of nuclear power plant reactors using OpenMC software. Familiarization with the OpenMC environment. Defining the materials, geometry and physical parameters of selected energy reactors. Implementation of neutron calculations. Analysis and processing of results.

Teaching methods

Lecture delivered remotely using synchronous access methods.
Lectures:
Multimedia presentation.
Laboratory classes:
Classes carried out at computer workstations using OpenMC software.

Bibliography

Basic:
1. Pawlik M., Strzelczyk F., Elektrownie WNT 2023
2. Marecki J., Podstawy przemian energetycznych, WNT-2014
3. Kubowski J. Elektrownie Jądrowe WNT 2013
4. Chmielniak T. Technologie energetyczne, PWN 2021
5. Celiński Z. Strupczwski A. Podstawy energetyki jądrowej, WNT 1984
6. Dobrzyński L. (red.) Zarys nukleoiniki, PWN, 2017

Additional:
1. Jezierski G. Energia jądrowa wczoraj i dziś, WNT 2005
2. Radosław Szczerbowski,/redakcja naukowa. Energetyka węglowa i jądrowa: wybrane aspekty, Poznań 2017
3. Lech M., Elektrownie jądrowe, WPWr 1992
4. Celiński Z., Energetyka jądrowa, PWN 1991

5. Gnutek Z., Kordylewski W. Maszynoznawstwo energetyczne, Oficyna Wydawnicza Politechniki Wrocławskiej 2003

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	32	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	18	0,50