COURSE DESCRIPTION CARD - SYLLABUS

Course name
Material testing for NPP structures [S2EJ1>BMwOEJ]

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
elective

Number of hours

Lecture
30

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

1. Knowledge: The student knows the basics of material strength, including the calculation of basic physical and geometric characteristics of plane cross-sections. The student has basic knowledge of materials used in construction. 2. Skills: The student is able to identify weak points of the structure based on the basic material characteristics of the cross-sections and organoleptic assessment of the materials used. 3. Social competences: The student is aware of the seriousness of the investment process and the essence of investing in strategic facilities in the country. Student is able to work in a team and is sensitive to the needs of colleagues when carrying out joint design exercises in groups. Student knows the basics of design and implementation guidelines in accordance with the technical conditions for acceptance and execution of construction works.

Course objective

The course presents the possibilities of using modern materials used in the construction and operation of nuclear energy facilities. The knowledge transferred concerns objects constructed in various places around the world. In particular, it is related to modern building and shielding materials in the nuclear energy sector. Contemporary directions in the development of covering and protective materials ensuring maximum safety for facility users are also discussed.

Course-related learning outcomes

Knowledge:
Knowledge of the latest trends in nuclear energy construction, with particular emphasis on shielding materials and other key elements of the structure.

Skills:
Learning the basic guidelines for verifying and assessing the degree of damage to covering materials. Designing virtual parameters of shielding elements based on the characteristics of the latest materials and materials still under development. Building your own computer algorithms based on the presented procedures.

Social competences:
Ability to work effectively in a group to accomplish a key task assigned to the project team.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:
1. Characteristics of modern materials used in Nuclear Power Plant (NPP).
2. Description of the basic properties of materials used in NPP.
3. Cd - mechanical and strength properties.
4. Cd - radiation absorption properties.
5. Cont. - material rheology.
6. Examples of material applications in the NPP life cycle.
7. Disposal and storage of materials showing mechanical damage.
8. Basic tasks and design of NPP protective elements.
9. Cont. - protective elements.
10. Cont. - protective elements.
11. Cont. - protective elements.
12. Basic directions of research on modern materials for use in nuclear power plants.
13. Discussion of selected NPP objects as exemplary design solutions.
14. Systematizing knowledge in tabular form for each of the discussed areas.
Completion of the course in the form of a written assessment.
Auditorium exercises:
not applicable

Programme content

Safety and modern knowledge in the field of materials used in strategic energy facilities in Poland and abroad.

Course topics

none

Teaching methods

Informative lecture with multimedia presentation.
Computer laboratory: problem method, case analysis, project method, team work

Bibliography

Basic:
1. ACI CODE-349-13 Code Requirements for Nuclear Safety-Related Concrete Structures and Commentary
2. Handbook of Nuclear Engineering, Autor Dan G. Cacuci, 2010 p.3574
3. Budownictwo w technice jądrowej, Ablewicz Z., Józnik. B. 1978 Warszawa

Additional:
The U.S. Nuclear Regulatory Commission (NRC), www.nrc.gov

Breakdown of average student's workload

	Hours	ECTS
Total workload	85	3,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50