COURSE DESCRIPTION CARD - SYLLABUS

Course name
Radiological Protection [S1FT2>OR]

Course

Field of study
Technical Physics

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-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 physics and chemistry. Understanding of atomic structure, atomic nucleus, and basic statistical mathematics. Ability to solve simple physical problems based on acquired knowledge, ability to gather information from provided sources.

Course objective

To familiarize students with theoretical and practical issues related to the use of radioactive isotopes and ionizing radiation, including the principles and standards of radiological protection and basic legal norms related to the use of ionizing radiation sources. To present issues related to the risk assessment of working with radioactive substances. To learn the principles of measurements of quantities characterizing ionizing radiation. To develop students' skills in solving engineering problems and preparing projects.

Course-related learning outcomes

Knowledge:
Has organized knowledge about physical phenomena in the field of radiological protection
Knows the basic principles of isotopic measurements
Possesses the basic knowledge necessary to understand the social, economic, legal, and other non-

technical conditions of engineering activities, including those related to radiation protection and environmental physics.

Skills:
Can independently and clearly prepare engineering project documentation in Polish, with well-documented and interpreted calculation results
Can correctly use standard analytical and computational tools to solve detailed physical and technical problems; can critically assess the results of such analysis
Can identify a technical problem and then propose an analysis scheme and/or solution, highlighting its significant physicochemical aspects
Can select materials with appropriate physicochemical and structural properties for laboratory and engineering applications
When formulating and solving engineering tasks, recognizes their social, economic, and legal aspects

Social competences:
Can work independently and as part of a team responsibly on the assigned task
Is aware and understands the importance of non-technical aspects and consequences of engineering activities, including its impact on the environment and associated responsibility for decisions made

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Oral individual answers, protocols, and written micro-project assessment: 50.1%-70.0% (grade 3), 70.1%-90.0% (grade 4), from 90.1% (grade 5).
Oral individual answers and written micro-project assessment: 50.1%-70.0% (grade 3), 70.1%-90.0% (grade 4), from 90.1% (grade 5).

Programme content

This course provides a comprehensive exploration of radioactive decay, ionizing radiation, detection methods, radiation-matter interactions, and the biological effects of radiation. It covers industrial and medical uses of ionizing radiation sources, along with practical exercises in the laboratory focusing on radioactivity, radiation detection techniques, spectral analysis, dose calculations, and shielding methods. Students will also gain insight into international and Polish atomic law regulations.

Course topics

Radioactive decay, ionizing radiation, detection of ionizing radiation, interaction of radiation with matter, absorption of radiation, impact of radiation on living matter. Laboratory, industrial, and medical applications of ionizing radiation sources. Measurement and calculation of ionizing radiation doses, calculation of shields. Basics of international and Polish atomic law.
Laboratory exercises provide a practical illustration of the lecture material covering radioactivity, radiation detection, spectral analysis, interactions of radiation with matter, doses, shields, elements of atomic law.

Teaching methods

Lecture: Illustrated with diagrams, animations, and photos.
Laboratory: Isotope laboratory.

Bibliography

Basic:
1. J. Sobkowski: Chemia jądrowa, PWN 1981
2. W. Szymański: Chemia jądrowa, PWN 1996
3. S. Magas: Technika izotopowa, WPP 1994
4. W. Gorączko: Radiochemia i ochrona radiologiczna. WPP 2003
5. J. Sobkowski, M. Jelińska-Kazimierczuk: Chemia Jądrowa. Wydawnictwo Adamantan 2006.

Additional:
1. M. Bryszewska i inni: Biofizyka dla biologów, PWN 1997

2. W. Scharf: Akceleratory biomedyczne, PWN 1994
3. Bezpieczeństwo jądrowe i ochrona radiologiczna - Prawo Atomowe, przepisy wykonawcze i przepisy związane, Warszawa 1991
4. PN-69/J-80001: Materiały i sprzęt ochronny przed promieniowaniem X i gama (Obliczanie osłon stałych).

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00