



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Zastosowania techniczne izotopów promieniotwórczych (Technical application of radioisotopes)

		Course
Field of study		Year/Semester
Technologia chemiczna (Chemical Technology)		IV/8
Area of study (specialization)		Profile of study
		general academic
Level of study		Course offered in
First-cycle studies		Polish
Form of study		Requirements
part-time		elective

		Number of hours
Lecture	Laboratory classes	Other (e.g. online)
20	0	0
Tutorials	Projects/seminars	
0	0	
<b>Number of credit points</b>		
1		

		Lecturers
Responsible for the course/lecturer:		Responsible for the course/lecturer:
dr inż. Wiesław Gorączko		dr inż. Wiesław Gorączko
email: wieslaw.goraczko@put.poznan.pl		email: wieslaw.goraczko@put.poznan.pl
tel. 616652067		tel. 616652067
Faculty of Chemical Technology		Faculty of Chemical Technology
ul. Piotrowo 3 60-965 Poznań		ul. Piotrowo 3 60-965 Poznań

**Prerequisites**

Background of nuclear physics - [K2\_W02(P7S\_WG)].

From the lectures and discussions student can logically formulate conclusions - [K2\_U02(P7S\_UW)].

The student understand the limitation of own knowledge and understands that he need more far greater depth. Student is the subject and not the object of the education - [K2\_K03(P7S\_KR)].

### Course objective

Introduction of the students with the radiological protection principles (the Polish atomic right). Introduction with basic instruments and dosimeters. Performance of problems connected with the evaluation of the work risk with radioactive substances. Introduction of the students with the



development of the measurement methods of the nuclear radiation. Student's preparation to the realization of projects connected with the radiological protection. Representing risk connected with applying the ionizing radiation. Some examples of application of radioisotopes to solve technical problems.

### Course-related learning outcomes

#### Knowledge

1. Student has knowledge on the subject of the characteristic features of the various type of the nuclear radiation - [K2\_W01(P7S\_WG)].
2. Student describes the phenomena of the influence of the ionizing radiation ionizing with the matter - especially with biological systems - [K2\_W05(P7S\_WG)].
3. Student has general knowledge about using of radioactive substances and sources in technique, industry, science and medicine - [K2\_W02(P7S\_WG)].
4. Student knows the principles how work and use radioisotopes sources and can characterized probable risk - [K2\_W02(P7S\_WG)].
5. Student distinguishes the kinds of the nuclear radiation and makes the classification of the risk - [K2\_W01(P7S\_WG)].
6. Student knows basic controls resulting from the Polish atomic right - [K2\_W05(P7S\_WG)].
7. Student possesses basic knowledge on the basic radiation protection - [K2\_W02(P7S\_WG)].
8. Student analyses the working of the various type of instruments and dosimeters - [K2\_W01(P7S\_WG)].

#### Skills

1. The student knows how formulate general and partial conclusions on the basis of got lectures and own knowledge - [K2\_W02(P7S\_WG)].
2. The student knows how to use the literature of the object, objective lecture, the bases of given and different sources -[K2\_W01(P7S\_WG)].
3. The student knows requirements relating the work with radiation sources - [K2\_W02(P7S\_WG)].
4. The student be able work and co-operate in a few people team - [K2\_W05(P7S\_WG)].

#### Social competences

1. The student responsibility for the work in the team - [K2\_K01(P7S\_WG)].
2. The student limitation of own knowledge; he understands that need the more education - [K2\_W03(P7S\_WG)].



## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Presentation of the Final Report - pdf material

## Programme content

Lecture :

Basic elements of nuclear physics - nucleus parameters. Alfa, beta, gamma and neutron radiations. Radiation phenomena; natural and artificial radioactive elements. Basic knowledge in nuclear physics and techniques. Interaction of radiation with matter. Measurement of nuclear radiation - gamma, beta, alfa and neutron measurement techniques. Some elements of the Polish Atomic Law. Basic elements of radiation protection - radioactive sources, doses, radiation attenuation, ionizing radiation shields, radioactive waste, health and safety precautions, personal protection. Influence of ionizing radiation on biological objects and environment. Contamination and decontamination procedures. Waste management; Application of radiometric methods in controlling typical factories processes (chemical, mechanical and hydraulic). Application of radioactive elements - technical, medical and environmental protection.

## Teaching methods

1. Lecture - multimedia presentation
2. Consultations

## Bibliography

Basic

1. W.Goraczko, Radiochemistry and Radiation Protection, PP Poznan 2003.
2. W.Goraczko, Radiation Protection, PP Poznan 2011.
3. J.Sobkowiak, Nuclear Chemistry, PWN, Warszawa, 1990
4. B.Dziunikowski, Application of Ionizing Radiation Sources in Techniques, Agriculture, Medicine; AGH, Kraków 1995

Additional

1. W.Goraczko, Nuclear Chemistry, PP Poznan 2012.
2. Radiation Protection - materials from IAEA (International Atomic Energy Agency), Polish National Atomic Energy Agency and Polish Nuclear Society



### Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,0
Classes requiring direct contact with the teacher	20	0,7
Student's own work (literature studies, preparation for the pass) <sup>1</sup>	10	0,3

<sup>1</sup> delete or add other activities as appropriate