

**RADIOACTIVE ELEMENTS IN POWER INDUSTRY AND SOIL POLLUTION  
CONTROL**  
(3 ECTS) *Elective*

**Responsible person:**

Dr hab. Barbara Kubica

**Learning outcomes:**

The main objective of the course is to bring to the students knowledge of analytical and radiochemical methods as applied to nuclear energy and the environmental protection

After completion of the course students should be able to:

- Assess the level of activity of selected radionuclides and concentrations of certain heavy metals at the possible contamination of the environment
- Discuss and present to the public the current problems of environment contamination
- Propose a process for decontaminating a contaminated area
- Choose and propose an appropriate selective and low-cost sorbents for removing the effects of contamination

**Course main content:**

The course is built of three parts: lectures (15 h), laboratory (20 h) and seminar (10 h)

**Lectures:**

During lectures students will be acquainted with the most important issues methods of radiochemistry as will be to applied to the environmental

Lectures will concern the following subjects:

Knowledge of the basic concepts of analytical chemistry with elements of radiochemistry and environmental chemistry in the radiochemistry field, specifically :1) the structure of an atomic nucleus, 2) nuclear transformations of alpha, beta and gamma, 3) the presence of radioactive elements, both natural and artificial in natural environment, 4) environmental monitoring of artificial radionuclides in terms of nuclear energy,

**Laboratory:**

- Characteristics of radiation counters
- Interaction of radiation with matter
- Determination of  $^{137}\text{Cs}$  activity in samples of soil and sediment
- Gamma spectrometry
- Determination of distribution coefficient  $^{137}\text{Cs}$  for the selected sorbents

**Seminars:**

Seminars are connected to the topics presented during the lectures and related to the proposal, preparation and methods of decontamination of cesium 137 from environmental samples. The student has to prepare a presentation illustrating the problems identified by the teacher, based on literature data and discussed.

**Admission requirements:**

Basics in chemistry and radiochemistry

### Literature:

1. G.R.Choppin, J.O.Liljenzin, J.Rydberg; Radiochemistry and Nuclear Chemistry, Butterworth-Heinemann, Oxford 1996

2. Handbook of Nuclear Chemistry, Kluwer Akademi Publishers, 2003

3. K.H.Lieser; Nuclear and Radiochemistry: Fundamentals and Applications, 2010

### Assessment:

- evaluation of laboratory reports
- evaluation of presentation prepared for a seminar and discussion following the presentation
- test – solving problems defined by the ILOs.

Rules of final credit: The average of the grades: laboratory (30 %), seminar (30 %) and test (40 %).