University of Gdańsk

Subject card

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|---|---|---|---|
| Subject name and code | Chemical and radiochemical trace analysis, PG_00054827 | | |
| Field of study | Environmental Protection | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | 2024/2025 |
| Education level | postgraduate studies | Subject group | Obligatory subject group in the field of study |
| Mode of study | full-time studies | Mode of delivery | at the university |
| Year of study | 1 | Language of instruction | Polish |
| Semester of study | 1 | ECTS credits | 2.0 |
| Learning profile | academic | Assessment form | |
| Conducting unit | Pracownia Toksykologii i Ochrony Radiologicznej -> Katedra Chemii i Radiochemii Środowiska -> Faculty of Chemistry | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr Grzegorz Olszewski | |
| | Teachers | prof. dr hab. Bogdan Skwarzec | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 15.0 | 0.0 | 0.0 | 0.0 | 0.0 | 15 |

E-learning hours included: 0.0

Additional information:
Lecture with multimedia presentation

**Learning activity and number of study hours**

| Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|
| Number of study hours | 15 | 2.0 | 33.0 | 50 |

**Subject objectives**

familiarizing students with all issues mentioned in the lecture program content,

introducing students to the basics of chemical calculations in radiochemistry, radiological protection, electrochemistry and spectroscopy,

developing the ability to independently experiment, perform measurements and solve problems while conducting experiments and measurements.

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|---|---|---|---|
| | [OŚMU2_U02] Uses advanced measurement and analytical techniques used in environmental protection. | knows and understands the basic concepts of trace analysis,<br><br>knows the methods and criteria for preparing environmental samples for analysis,<br><br>understands the types of nuclear reactions, nuclear transformations and methods<br>radiometrics used in the analysis of radioactive elements,<br><br>knows the concept of radiation dose and distinguishes its types,<br><br>knows and understands electroanalytical and spectroscopic methods used for quantitative determination of elements,<br><br>understands and is able to characterize agalite concentration methods,<br><br>knows the concept of speciation and understands its application in trace analysis,<br><br>understands the concept and application of validation in trace analysis,<br><br>distinguishes and applies basic criteria for assessing analytical results,<br><br>knows statistical tests used in the evaluation of analytical results as well<br>analytical laboratories<br>and is able to use it appropriately to carry out measurements,<br><br>is able to calculate the decrease in the activity of radioactive elements over time, is able to calculate the weakening of ionizing radiation by<br>fixed shutters | [SU4] test/exam - oral or written |
| | [OŚMU2_K01] Behaves in a professional manner at all times; bears full responsibility for the actions taken relating to the protection of the environment and respects the principles of professional ethics and principles of intellectual honesty. | can present in an understandable way, both orally and in writing correct reasoning from trace analysis,<br><br>predicts, verifies and criticizes the results<br>experiments,<br><br>is able to statistically analyze analytical results and critically analyze them<br>evaluation | [SK4] test/exam - oral or written |
| | [OŚMU2_U03] Plans and performs research tasks in the field or laboratory and interprets research results on environmental issues (working individually or in a team assuming various roles, including managerial functions). | understands the need for further education in trace analysis,<br><br>demonstrates creativity in independent and team work | [SU1] oral statement/conversation/ discussion |
| | [OŚMU2_K02] Recognises threats, creates safe work conditions and is responsible for the safety of own and other people's work. | Understands the danger of working with radioactive materials | [SK1] oral statement/conversation/ discussion |
| | [OŚMU2_W09] Applies safety and hygiene principles when working independently on a test or measurement stand in a laboratory or in the field. | Can define negative effects on the human body resulting from careless use of radioactive substances | [SW1] oral statement/ conversation/discussion |

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<tr><th>Course outcome</th><th>Subject outcome</th><th>Method of verification</th></tr>
<tr><td>[OŚMU2_W04] Chooses methods, techniques and research tools used in environmental protection.</td><td>recognizes basic equipment in radiochemistry, electrochemistry and spectrophotometry<br>and is able to use it appropriately to carry out measurements</td><td>[SW1] oral statement/ conversation/discussion</td></tr>
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<tr><td>Subject contents</td><td>Lecture topics: 1. Basic concepts of trace analysis. Analytical techniques used in the analysis of chemical elements. Nuclear chemistry methods in trace analysis: alpha, beta and gamma spectrometry. Electrochemical and spectral methods in trace analysis: potentiometry, coulometry, UV-VIS spectrophotometry. Analyte concentration methods: mineralization and co-precipitation. Validation and evaluation criteria of analytical results in trace analysis: precision, repeatability, reproducibility, accuracy, limit of quantification and detection, certified reference materials and their use in trace analysis. Calibration of measuring equipment, standard addition method and correlation. Statistical tests used in trace analysis. Speciation and speciation analysis.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test</td><td>50.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>B. Skwarzec Radiochemia środowiska i ochrona radiologiczna, Wydawnictwo DJ s.c, Gdańska, 2002<br><br>W. Szymański Chemia jądrowa, PWN, Warszawa 1996</td></tr>
<tr><td>Supplementary literature</td><td>None</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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