

Subject card

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| Subject name and code | Environmental Monitoring in Company, PG_00081034 | | | | | | |
| Field of study | Business and Environmental Technology | | | | | | |
| Date of commencement of studies | October 2023 | Academic year of realisation of subject | | | | 2024/2025 | |
| Education level | Master's studies | Subject group | | | | | |
| Mode of study | full-time studies | Mode of delivery | | | | at the university | |
| Year of study | 2 | Language of instruction | | | | Polish | |
| Semester of study | 3 | ECTS credits | | | | 2.0 | |
| Learning profile | academic | Assessment form | | | | exam | |
| Conducting unit | Department of Environmental Analysis -> Faculty of Chemistry -> Rector | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. Magda Caban | | | | |
| | Teachers | | dr hab. Magda Caban | | | | |
| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 7.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7 |
| | E-learning hours included: 0.0 | | | | | | |
| 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 | 7 | | 0.0 | | 0.0 | 7 |
| Subject objectives | familiarizing students with instrumental methods used in trace analysis, developing the ability to independently perform calculations necessary for the correct interpretation of analysis results, developing the ability to independently select the appropriate analytical technique for a given problem, acquiring the ability to independently design and implement experiments regarding the determination of selected trace environmental pollutants acquiring practical skills regarding procedures in a chromatographic laboratory. | | | | | | |

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|-------------------|--|--|--|
| | [BiTEMU2_K03] understands the need to properly set priorities, plan and organize tasks related to their implementation, as well as monitor and evaluate progress | Understands the need for further education. To a basic extent, it consciously assesses the impact of human activities on the natural environment. | [SK1] oral statement/conversation/discussion |
| | [BiTEMU2_W01] describes the relationship between economics and ecological technology, their place in the system of social and exact sciences at an advanced level | Lists the basic legal acts relevant to environmental monitoring in the enterprise. Defines basic methods of environmental monitoring. | [SW4] test/exam - oral or written |
| | [BiTEMU2_K07] demonstrates responsibility for the safety of one's own work and that of others, taking into account the risks resulting from the research techniques used, and creates conditions for safe work in the laboratory or in the field | Demonstrates creativity in working independently and in teams. Is responsible for the safety of his own work and that of others: he knows how to act in emergency situations, is careful when dealing with chemical substances, and is prudent when dealing with measuring equipment. | [SK4] test/exam - oral or written |
| | [BiTEMU2_U06] uses advanced methods, techniques, and tools to assess the quality of the environment and the effectiveness of the technological processes used | Applies basic techniques and research tools for environmental monitoring. | [SU4] test/exam - oral or written |
| | [BiTEMU2_W11] applies safety and hygiene rules when working independently at a research or measurement station in the laboratory or in the field at an advanced level | Illustrates the assumptions of monitoring and interprets research results | [SW1] oral statement/conversation/discussion |
| | [BiTEMU2_W10] explains the mechanisms of unit processes used in remediation and environmental protection as well as waste management methods at an advanced level | Describes the purpose, meaning and content of environmental quality standards. | [SW4] test/exam - oral or written |
| | [BiTEMU2_K02] understands the need to cooperate and work in a group, assuming responsible roles within it | Is responsible for the safety of his own work and that of others: he knows how to act in emergency situations, is careful when dealing with chemical substances, and is prudent when dealing with measuring equipment. | [SK1] oral statement/conversation/discussion |
| | [BiTEMU2_U08] searches, selects and analyzes the literature on environmental sciences, including scientific journals and databases, reading and understanding scientific texts in the native language and English | Uses literature and legal acts regarding environmental monitoring. | [SU4] test/exam - oral or written |
| | [BiTEMU2_W09] predicts the effects of human interference in the natural environment and analyzes the impact of human activity on the quality of the environment on a local, regional and global scale at an advanced level | The student identifies and recognizes the types and types of main chemical pollutants. Illustrates the assumptions of monitoring and interprets research results. | [SW4] test/exam - oral or written |
| | [BiTEMU2_U05] is able to give a presentation and independently prepare various specialized written works appropriate for the field studied or in the area on the border of various scientific disciplines, using basic theoretical approaches, collecting various sources of data, their description and interpretation, and drawing conclusions based on scientific literature and the results of own research work | Describes environmental monitoring issues in understandable language. Formulates opinions on basic environmental monitoring issues. Prepares a documented study of measurement results in the field of environmental monitoring in Polish. | [SU1] oral statement/conversation/discussion |
| | [BiTEMU2_W02] distinguishes legal and administrative mechanisms and procedures in environmental protection and interprets its international dimension at an advanced level | Describes the purpose, meaning and content of environmental quality standards. | [SW1] oral statement/conversation/discussion |

| | Course outcome | Subject outcome | Method of verification |
|---------------------------------|--|---|---|
| | [BiTEMU2_U09] plans and performs research tasks in the field or laboratory and interprets research results on environmental protection issues | Applies basic techniques and research tools for environmental monitoring. Conducts simple measurements of selected environmental pollutants. Follows established analytical procedures for measurements. Evaluates the obtained results using basic statistical tools. | [SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written |
| Subject contents | The concept of trace analysis and its importance. Errors in trace analysis due to sample contamination and analyte losses. Concentration units used in trace analysis. The use of standards and reference materials in trace analysis. Discussion of the instrumental methods most often used in trace analysis: chromatographic methods (gas chromatography, HPLC liquid chromatography), mass spectrometry (MS), combination of gas chromatography and liquid chromatography with mass spectrometry (GC-MS and LC-MS), spectroscopic methods (absorption spectrophotometry in the UV-VIS and IR range) | | |
| Prerequisites and co-requisites | <p>A. Formal requirements: General chemistry, organic chemistry, inorganic chemistry, analytical chemistry</p> <p>B. Entry requirements: Knowledge of basic issues in general chemistry, organic chemistry, inorganic chemistry and analytical chemistry</p> | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Exam with open questions | 51.0% | 100.0% |
| Recommended reading | Basic literature | <p>Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Monitoring i analityka zanieczyszczeń w środowisku. Wydawnictwo UG 2010</p> <p>Johnstone W. R. A., Rose M. E., Spektrometria mas, PWN, Warszawa 2001</p> <p>Witkiewicz Z. Podstawy chromatografii, WNT, Warszawa, 2005.</p> <p>Szczepaniak W. Metody instrumentalne w analizie chemicznej, PWN, Warszawa, 1996.</p> <p>Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Techniki separacyjne. Wydawnictwo UG 2010</p> <p>Johnstone W. R. A., Rose M. E., Spektrometria mas, PWN, Warszawa 2001</p> <p>Witkiewicz Z. Podstawy chromatografii, WNT, Warszawa, 2005.</p> <p>Szczepaniak W. Metody instrumentalne w analizie chemicznej, PWN, Warszawa, 1996.</p> | |

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| | Supplementary literature | <p>Kocjan R. Chemia analityczna. Podręcznik dla studentów. Tom 2. PZWL, Warszawa, 2000.</p> <p>Szczepaniak W. Metody instrumentalne w analizie chemicznej, PWN, Warszawa, 1996.</p> <p>Witkiewicz Z., Hepter J. Chromatografia gazowa, WNT, Warszawa, 2009.</p> |
| Example issues/ example questions/ tasks being completed | eResources addresses | <p>Qualitative and quantitative analysis in chromatography Water and gas sampling Advanced extraction techniques Trace analysis errors, cause and elimination Examples of determinations of persistent and new environmental pollutants</p> |
| Work placement | Not applicable | |

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