



Subject card

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|---|---|--|---|-------------------------------------|--|------------|-----|
| Subject name and code | Instrumental techniques in environmental biology, PG_00043560 | | | | | | |
| Field of study | Green Technologies | | | | | | |
| Date of commencement of studies | October 2023 | Academic year of realisation of subject | | | 2023/2024 | | |
| Education level | second-cycle studies | Subject group | | | Obligatory subject group in the field of study Subject group related to scientific research 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 | | | 5.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr inż. Izabela Koss-Mikołajczyk | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 0.0 | 15.0 | 0.0 | 15.0 | 60 |
| | 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 | 60 | | 5.0 | | 60.0 | 125 |
| Subject objectives | Acquainting students with microorganisms inhabiting the environment. Learning instrumental techniques (spectroscopic, chromatographic, molecular biology techniques) for the assessment of the interaction of the environment and the microorganisms inhabiting it. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | [K7_K03] can consciously and supported by the experience to present your work, provide information in a manner commonly understood, to communicate, to make self-assessment and constructive criticism of the work of others, the reasons for different points of view | | The student is able to make a critical literature review on a given topic and prepare presentation based on them. | | [SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work | | |
| | [K7_U02] able to operate equipment and perform typical analyzes of studies of environmental pollution and design and oversee the environmentally friendly technologies and zero-waste technologies, can perform expert on the environmental impact of technology already working | | The student knows how to use specialized analytical equipment to determine specific parameters. | | [SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information | | |
| | [K7_W01] a broader and deeper knowledge of certain branches of mathematics, including elements of applied mathematics and optimization methods including mathematical methods, useful to formulate and solve complex tasks in the field of environmental technologies and modern analytical methods | | Student can interpret the obtained results and make their statistical analysis. | | [SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge | | |

| Subject contents | <p>LECTURE: Fundamentals of environmental biology. Microorganisms inhabiting the environment. The impact of environmental pollution on microorganisms that live in it. Microbiological techniques in environmental biology. Basic issues of biohydrometallurgy, biocorrosion and bioremediation. Application of atomic absorption spectroscopy, chromatographic and spectroscopic molecular biology techniques in environmental biology.</p> <p>SEMINAR: The impact of GMO crops on the environment. The influence of the environment on the cultivation of GMOs. Phytoremediation. Bioremediation. Alternative plant protection products. The use of effective microorganisms in agriculture. Microorganisms and climate change. Influence of pesticides on soil microorganisms. Degradation of endocrine compounds by soil organisms. The influence of the presence of antibiotics in the environment on soil microorganisms. The influence of pollutants on water microorganisms. Self-purification of surface waters. The influence of nutrition on the gut microbiome. The influence of the environment on the gut microbiome.</p> <p>LABORATORY: Microbiological methods of air purity assessment. Application of high performance thin layer chromatography (HPTLC) for the qualitative analysis of pesticides in samples of animal origin. Application of the comet assay to determine the genotoxic effect of environmental pollutants. The use of molecular biology techniques in biomonitoring. Techniques for determining microbiological purity of water.</p> | | | | | | | | | | | | | | |
|--|--|---|--|--------------------------|-------------------|-------------------------------|---------------------|-------|-------|---------|-------|-------|---------|-------|-------|
| Prerequisites and co-requisites | <ul style="list-style-type: none"> • Basic knowledge of analytical chemistry • Basic knowledge of microbiology | | | | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1" data-bbox="448 763 1487 902"> <thead> <tr> <th data-bbox="448 763 794 801">Subject passing criteria</th> <th data-bbox="794 763 1141 801">Passing threshold</th> <th data-bbox="1141 763 1487 801">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 801 794 840">Laboratory exercise</td> <td data-bbox="794 801 1141 840">60.0%</td> <td data-bbox="1141 801 1487 840">10.0%</td> </tr> <tr> <td data-bbox="448 840 794 878">Lecture</td> <td data-bbox="794 840 1141 878">60.0%</td> <td data-bbox="1141 840 1487 878">70.0%</td> </tr> <tr> <td data-bbox="448 878 794 902">Seminar</td> <td data-bbox="794 878 1141 902">60.0%</td> <td data-bbox="1141 878 1487 902">20.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Laboratory exercise | 60.0% | 10.0% | Lecture | 60.0% | 70.0% | Seminar | 60.0% | 20.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | | | | |
| Laboratory exercise | 60.0% | 10.0% | | | | | | | | | | | | | |
| Lecture | 60.0% | 70.0% | | | | | | | | | | | | | |
| Seminar | 60.0% | 20.0% | | | | | | | | | | | | | |
| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Raina M.M., Pepper I.L., Gerba C.P. Environmental Microbiology 2. Hurst C.J., Garland J.L., Mills A.L., Crawford R.L., Lipson D.A., Stetzbach L.D. Manual of environmental microbiology. 3. Polymerase Chain Reaction: Applications in Environmental Microbiology. Ann. Rev. Microb. Vol. 45, pp 137-161, 1991 | | | | | | | | | | | | | |
| | Supplementary literature | <ol style="list-style-type: none"> 1. da Silva, S., Gonçalves, I., Gomes de Almeida, F. C., Padilha da Rocha e Silva, N. M., Casazza, A. A., Converti, A., & Asfora Sarubbo, L. (2020). Soil Bioremediation: Overview of Technologies and Trends. Energies, 13(18), 4664. 2. Nguyen, B. A. T., Hsieh, J. L., Lo, S. C., Wang, S. Y., Hung, C. H., Huang, E., ... & Huang, C. C. (2020). Biodegradation of dioxins by Burkholderia cenocepacia strain 869T2: Role of 2-haloacid dehalogenase. Journal of Hazardous Materials, 401, 123347. 3. Franco-Duarte, R., Černáková, L., Kadam, S., S Kaushik, K., Salehi, B., Bevilacqua, A., ... & Relison Tintino, S. (2019). Advances in chemical and biological methods to identify microorganisms - from past to present. Microorganisms, 7(5), 130. 4. Karlsson, R., Gonzales-Siles, L., Boulund, F., Svensson-Stadler, L., Skovbjerg, S., Karlsson, A., & Moore, E. R. (2015). Proteotyping: Proteomic characterization, classification and identification of microorganisms - A prospectus. Systematic and Applied Microbiology, 38(4), 246-257. | | | | | | | | | | | | | |
| | eResources addresses | Adresy na platformie eNauczanie: | | | | | | | | | | | | | |
| Example issues/ example questions/ tasks being completed | <p>Bioremediation</p> <p>Biohydrometallurgy</p> <p>Biodegradation</p> <p>Effective microorganisms</p> | | | | | | | | | | | | | | |
| Work placement | Not applicable | | | | | | | | | | | | | | |