GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | Biologically Active Plant Substances, PG_00058235 | | |
| Field of study | Biotechnology | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | 2022/2023 |
| Education level | second-cycle studies | Subject group | Obligatory subject group in the field of study<br>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 | 2 | ECTS credits | 3.0 |
| 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 hab. inż. Barbara Kusznierewicz | |
| | Teachers | dr hab. inż. Barbara Kusznierewicz<br>Zuzanna Koziara | |

| Lesson types and methods of instruction | | | | | | | |
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| | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 30.0 | 0.0 | 0.0 | 45 |
| | E-learning hours included: 0.0 | | | | | | |

| Learning activity and number of study hours | | | | | |
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| | Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
| | Number of study hours | 45 | 5.0 | 25.0 | 75 |

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| Subject objectives | The aim of the course is to familiarize students with the classification, occurrence and biological activity of plant secondary metabolites, methods of their acquisition and analysis, and to present their role in plant life, practical importance for humans and biotechnological methods of their production. |

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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [K7_U05] is able to apply instrumental methods of quantitative and qualitative analysis and studies on activity of biomolecules, select and apply diagnostic and analytical methods in the field of his/her specialty with particular emphasis on genetic, molecular and microbiological diagnostics and diagnostics based on antigen-antibody reaction | The student selects appropriate techniques and performs analyzes of individual groups of phytochemicals. Analyzes the obtained results and evaluates the quality of the tested material in the context of its biological activity. | [SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |
| | [K7_W02] has advanced knowledge of structure and activity of enzymes and biologically active compounds also in pharmacological context, knows basic instrumental methods of qualitative and quantitative analysis and activity studies of biomolecules | The student distinguishes between different classes of phytochemicals, knows their potential use in various industries and is able to adapt analytical procedures to qualitative and quantitative determinations as well as biological activity. | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge |
| | [K7_W07] knows issues related to plant and animal raw materials, their quality, impact on human health, processing technology and chemical and biological hazards resulting from process treatment and storage | The student has knowledge of plant raw materials, their quality, biological activity and methods of processing and use in industry. | [SW1] Assessment of factual knowledge |
| | [K7_K03] is conscious and able to explain the importance of the development of science and technology for the economy | The student understands the importance of continuous acquisition of knowledge and conducting scientific research as key elements of the development of civilization. | [SK5] Assessment of ability to solve problems that arise in practice |
| | [K7_U04] is able to predict potential properties of biomolecules and biologically active compounds on the basis of knowledge of their chemical structure and apply methods of molecular modelling of biomolecules | The student is able to predict the potential properties of biologically active compounds based on the knowledge of their chemical structure. | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |

**Subject contents**

Lectures: The history of the use of plant materials by man. The form of plant material and its classification. Principles of plant harvesting, modern methods of testing biologically active plant substances. Definition and systematics of plant secondary metabolites. The most important products of plant secondary metabolism, including: terpenes, phenolic compounds, compounds containing nitrogen and sulfur. Information will be given on the role they play in both plant and animal organisms, as well as examples of biotechnological methods of their production and the use of entire groups and/or individual compounds in various industries.Laboratories: 1. Determination of the effect of elicitation on the antioxidant properties of plant sprouts. 2. Purine alkaloids - isolation and quantification. 3. Isolation of essential oils and the use of TLC bioautography. 4. Determination of the antimicrobial activity of essential oils. 5. Establishing and running a microalgae culture. 6. Analysis of the grown micoalgae.

**Prerequisites and co-requisites**

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
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| Laboratory | 50.0% | 50.0% |
| Lecture | 50.0% | 50.0% |

**Recommended reading**

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| Basic literature | - Biochemia Roślin, Jerzy Kączkowski PWN<br>- Farmakognozja, Stanisław Kohlmunzer, Wydawnictwo Lekarskie PZWL<br>- Biotechnologia farmaceutyczna. Kayser O., Müller R. PZWL |
| Supplementary literature | - Plant Secondary Metabolites, Alan Crozier Michael N. Clifford Hiroshi Ashihara, Wiley |

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| | eResources addresses | Adresy na platformie eNauczanie:<br>BIOLOGICZNIE AKTYWNE SUBSTANCJE ROŚLINNE - Moodle ID: 29026<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29026 |
| Example issues/ example questions/ tasks being completed | Definition and classification of plant secondary metabolites.What are the functions of secondary metabolites in the plant?Examples of the use of phytochemicals in various industries.What biological activities can be expected from particular groups of plant secondary metabolites.Methods of isolation, analysis and detection of bioactive phytochemicals. | |
| Work placement | Not applicable | |