



## Subject card

|   |   |   |          |                                     |  |            |     |
|---|---|---|----------|-------------------------------------|--|------------|-----|
| Subject name and code                       | Biotechnology and Lipid Technology, PG_00058261   |   |          |                                     |  |            |     |
| Field of study                              | Biotechnology   |   |          |                                     |  |            |     |
| Date of commencement of studies             | October 2023  | Academic year of realisation of subject   |          |                                     | 2024/2025  |            |     |
| Education level                             | second-cycle studies  | Subject group   |          |                                     | Optional subject group<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                               | 2   | Language of instruction   |          |                                     | Polish   |            |     |
| Semester of study                           | 3   | ECTS credits  |          |                                     | 6.0  |            |     |
| Learning profile                            | general academic profile  | Assessment form   |          |                                     | exam   |            |     |
| Conducting unit                             | Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry  |   |          |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  | dr hab. inż. Dorota Martysiak-Żurowska  |          |                                     |  |            |     |
|   | Teachers  | dr hab. inż. Dorota Martysiak-Żurowska<br><br>dr inż. Karol Parchem<br><br>dr inż. Agata Sommer |          |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type   | Lecture   | Tutorial | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours   | 30.0  | 0.0      | 30.0                                | 0.0  | 15.0       | 75  |
|   | 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   | 75  |          | 20.0                                |  | 55.0       | 150 |
| Subject objectives                          | Familiarizing students with lipid biotechnology and technology in production processes of industrial importance in the food, fuel and pharmaceutical industries, as well as with the directions and possibilities of their development. |   |          |                                     |  |            |     |

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| Learning outcomes   | Course outcome   | Subject outcome   | Method of verification   |
|   | [K7_W08] has a profound knowledge of methods of obtaining biotechnological products, possibilities and limitations related to the design of biotechnological processes, understands the specificity of the biotechnological industry, both in terms of organization, management and economic analysis  | The student has knowledge of biotechnological and technological techniques used in the fat industry. Analyzes unit processes used in obtaining, modifying and refining of fats. Defines the goals and methods of obtaining lipids and their derivatives through biotechnology and their use in the food, pharmaceutical and technical industries. The student knows the possibilities and limitations of process design biotechnological. | [SW1] Assessment of factual knowledge<br>[SW2] Assessment of knowledge contained in presentation   |
|   | [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   | Analyzes and defines properties nutritional and physicochemical properties of plant and animal raw materials and fatty products obtained from them. He is aware of the impact of their quality on human health.   | [SW1] Assessment of factual knowledge<br>[SW2] Assessment of knowledge contained in presentation<br>[SW3] Assessment of knowledge contained in written work and projects |
| [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 is able to use instrumental analysis methods to study the properties and profiles of lipid biomolecules using the latest analytical methods.   | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools<br>[SU5] Assessment of ability to present the results of task  |  |
| Subject contents  | <p>Lecture: 1. Scopes of biotechnological activities used in obtaining, purifying, processing and modifying lipids.</p> <p>2. Biotechnology in the edible fat industry.</p> <p>3. Biotechnology in the production of biofuels.</p> <p>4. Biotechnology in the production of detergent ingredients and lipid derivatives for the cosmetics industry.</p> <p>5. Biotechnological use of lipids for pharmaceutical purposes. Liposome technology in basic research and clinical pharmacology</p> <p>6. Commercialized lipid-based products (including glycerol) produced biotechnologically</p> <p>7. Technologies for extracting, purifying and modifying food fats.</p> <p>Lab: Biotechnological processes of fat modification (esterification) and analysis of the impact of these processes on the physicochemical properties of fats. The use of biotechnological methods for the degradation of waste animal and plant fats. Seminar Student presentations based on the most current articles in the field presented in the course.</p> |   |  |
| Prerequisites and co-requisites   | Knowledge of the basics of food chemistry and food analysis.   |   |  |
| Assessment methods and criteria   | Subject passing criteria   | Passing threshold   | Percentage of the final grade  |
|   | laboratory   | 60.0%   | 30.0%  |
|   | seminar  | 60.0%   | 20.0%  |
|   | exam   | 60.0%   | 50.0%  |

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| Recommended reading  | Basic literature  | <ul style="list-style-type: none"> <li>- Biotechnologia żywności . WNT, pod red. W. Bednarski, A. Repsa</li> <li>- Technologia Tłuszczów Jadalnych. Niewiadomski H. WNT, Warszawa,</li> <li>- Surowce Tłuszczowe. Niewiadomski H. WNT, Warszawa,</li> <li>- Lipid Biotechnology Ed. Tsung Min k., Gardner H.</li> </ul> |
|  | Supplementary literature  | Current scientific articles on the issues of the subject, e.g. Journal of American Oil Chemists Society, Eur. J. Lipid Sci. Technol., INFORM (wyd. AOCS).   |
|  | eResources addresses  | Adresy na platformie eNauczanie:<br>Biotechnologia i technologia lipidów 2024/25 - Moodle ID: 41948<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41948">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41948</a>  |
| Example issues/<br>example questions/<br>tasks being completed | Chemical and enzymatic interesterification of edible fats. Obtaining cocoa butter substitutes by fractional crystallization method. Microbial bioconversion of fat waste. Conditions for biocatalysis to obtain biosurfactants. |   |
| Work placement   | Not applicable  |   |

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