

<b>Course title-</b> Biotechnologia żywności / Food biotechnology		<b>ECTS code</b> 13.3.0527	
<b>Name of unit administrating study</b> Faculty of Chemistry			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Chemistry	Bachelor	Full-time studies	
<b>Teaching staff</b> Dr Eng. Joanna Jeżewska-Fraćkowiak, dr Joanna Żebrowska			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b> 4	
<b>A. Forms of classes, in accordance with the UG Rector's regulations</b> lecture, laboratory classes		classes - 45 h tutorial classes – 10 h student's own work – 45 h	
<b>B. The realization of activities</b> in-class learning		Total: 100 h - 4 ECTS	
<b>C. Number of hours</b> 45 h (15 h lecture, 30 h laboratory classes)			
<b>The academic cycle</b> 2021/22 summer semester			
<b>Type of course</b> obligatory		<b>Language of instruction</b> Polish	
<b>Teaching methods</b> Team work Conducting experiments Experimental design Lecture with multimedia presentation		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
		<b>A. Final evaluation, in accordance with the UG study regulations</b> lecture – exam laboratory classes – course completion (with a grade)	
		<b>B. Assessment methods</b> Exam (activationg tasks during the lecture, followed by final test). Final grade assessment (Conducting the experiments during laboratory part, written documentation and final test)	
		<b>C. The basic criteria for evaluation or exam requirements</b> Lecture: 1. Test and open questions exam. 2. Final grade consistent with the scale given in UG Study Regulations 3. Additional term for the students, who didn't achieve 51% of possible assessment points. Laboratory 1. Conducting the experiments during laboratory part, according to the given protocol. 2. Laboratory report in a written form. 3. Test.	
<b>Required courses and introductory requirements</b> Biochemistry, Microbiology			
<b>Aims of education</b> 1. Presenting the topics given in lecture course contents. 2. Presenting microorganisms and basic food biotechnology processes 3. Presenting contemporary food biotechnology methods, with PCR for genetically modified food detection			

### Course contents

#### A. Lecture topics:

Food industry and agriculture, dairy industry, lactic acid bacteria and their characteristics, homo- and heterofermentation, bacteriophage infections and applications, fermented dairy products, fermented plant products, fermentation in bread and meat, pre- and probiotics, acetic acid bacteria characteristics and applications, acids, contaminations in fruit, vegetable and fermentation industry, aminoacids bioproduction, transgenic plants and animals, biotic and abiotic factors resistance, plants as bioreactors and edible vaccines, bacterial insecticides, engineering of biotoxins, genetically modified organisms in food production, diagnostic methods for GMO detection in foods, legal regulation for GMOs, environmental release.

#### B. Laboratory topics:

The biotechnological process of semi-hard pressed rennet cheese production, with MSE bacterial starter culture, milk and starter culture bacterial species microscoping; PCR mediated genetically modified Roundup Ready® soy detection in the food samples, complete DNA purification on silica membranes, PCR products electrophoresis

### Bibliography of literature

#### A. Literature required to pass the course

1. Bednarski W., Rejs A. (red.) (2001) Biotechnologia żywności, WNT, Warszawa.
2. Synowiecki J. (red.) (2009) Wybrane zagadnienia z technologii fermentacyjnych przemysłu spożywczego, WPG, Gdańsk.
3. Glick B.R., Pasternak J.J., Patten Ch. L (2010) Molecular biotechnology, ASM PRESS, 4th ed.
4. Holt J.G., Krieg N.R., Sneath P.H.A., Staley J.T., Williams S.T. (2000) Bergey's Manual of Determinative Bacteriology, 9th ed., Lippincott Williams & Wilkins
5. Querci M., Maretti M., Mazzara M. Badanie próbek żywności na obecność Genetycznie Zmodyfikowanych Organizmów. European Commission Joint Research Centre, World Health Organization, Regional Office for Europe
6. Tengel C., Schübler P., Setzke E., Balles J., Sprenger-Haußels M. (2001) PCR-Based Detection of Genetically Modified Soybean and Maize in Raw and Highly Processed Foodstuffs, BioTechniques 31:426-429.

#### B. Extracurricular readings

j.w., Libudzisz, Z., Kowal, K., Żakowska, Z. Mikrobiologia techniczna., Wydawnictwo naukowe PWN, 2008

#### B. Literatura uzupełniająca

Glick, R.B., Pasternak, J.J., Patten, Ch.L., Molecular Biotechnology. Principles and applications of Recombinant DNA. 4th edition, ASM Press 2010

Joshi, V.K., Singh, R.S., Food biotechnology. Principles and Practices. 2012, IK International Publishing House Ltd., New Delhi

### Knowledge

1. Student names and characterizes basic microorganisms applied in food biotechnology.
2. Student understands the role of microorganisms in food biotechnology.
3. Student names and describes the fermentation processes.
4. Student names and describes genetically modified microorganisms and organisms applications in food biotechnology.
5. Student names potential hazards of applying GMOs in food production
6. Student lists legal regulations of GMO usage in Poland and in the world.
7. Student describes possible method for obtaining transgenic plants and animals and describes potential directions of their features engineering.
8. Student names and characterizes contemporary methods for GMO diagnostics.

### Skills

Student performs microscopy observations and analyses microbiological content of the chosen food products (milk, rennet cheese).

Student prepares semi-hard pressed rennet cheese, with an addition of enzyme and MSE bacterial starter culture.

Student proposes application of different microbiological techniques for quantitative-qualitative food analysis.

Student proposes methods for practical application of diagnostic methods, allowing for GMO detection and food quality assessment.

Student names and values potential hazards, connected with industrial and agricultural processes, applied in food production, that may lead to losing the biodiversity or have the negative effect on human health.

Student performs the detection of genetic modification in food products, applying PCR technique and electrophoresis.

**Social competence**

1. Student understands need of further education.
2. Student carefully i critically expresses own opinions, bears in mind and values possibilities offered by modern food biotechnology and genetic engineering
3. Student is aware of food biotechnology and GMO applications potential hazards for environment and human health.
4. Student plans and performs given tasks working independently, is able to manage time and equipment, while working in team undertakes different roles.