SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM 2021 TO 2025

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	*Biotechnology*
Course/Module code *	
Faculty (name of the unit offering the field of study)	*Institute of Food Technology and Nutrition*
Name of the unit running the course	*Department of Bioenergetics, Food Analysis and Microbiology*
Field of study	*Biology, Biotechnology, Food Technology, Agriculture*
Qualification level	*first level*
Profile	*academic*
Study mode	*stationary*
Year and semester of studies	*I year 1 semester*
Course type	*basic*
Language of instruction	*english*
Coordinator	*dr Dorota Grabek-Lejko*
Course instructor	*dr Dorota Grabek-Lejko*

* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Colloquia	Lab classes	Seminars	Practical classes	Internships	others	**ECTS credits**
1	2			8				10	6

1.2. Course delivery methods

- conducted in a traditional way
- involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)
pass with a grade

2. PREREQUISITES

Basic knowledge of general biology

3. OBJECTIVES, LEARNING OUTCOMES, COURSE CONTENT, AND INSTRUCTIONAL METHODS

3.1. Course/Module objectives

O1	Provide basic knowledge in the field of biotechnology, possibilities of practical use of microorganisms and their components in the production of modification of products in scientific research, medicine, agriculture, food industry, and environmental protection, etc
O2	Overview of the basic metabolic changes and regulation of microbial metabolism. To acquaint students with modern methods of genetic engineering of organisms aimed at increasing the efficiency of bioprocesses.
O3	Acquiring the ability to perform and use the basic techniques and tools used to conduct biotechnological processes.

3.2. COURSE/MODULE LEARNING OUTCOMES (TO BE COMPLETED BY THE COORDINATOR)

Learning Outcome	The description of the learning outcome defined for the course/module	Relation to the degree programme outcomes
LO_01	characterizes microorganisms used in biotechnological processes and explains their use in various industries knows	*(K_W01)*
LO_02	lists and describes the methods of obtaining genetically modified organisms and their importance in the human economy	*(K_W01)*
LO_03	Has knowledge of basic techniques and research tools used in biotechnology	*(K_W01)*
LO_04	is able to select research methods, plan and carries out basic experiments, analyzes the results of the conducted experiments and draw conclusions	*(K-U03)*
LO_05	discusses topics related to the use of biotechnology, including GMOs in everyday life, verifies the views and controversies around genetically modified organisms	*(K_U03)*
LO_06	can recognize, evaluate and demonstrate awareness of possible microbiological hazards in the laboratory, environment, food, etc.	*(K_U03)*
LO_07	Is able to cooperate in group during laboratory analysis and also work independently	*(K_K01)*
LO_08	Is responsible for the equipment, is ready to take care of work safety in the laboratory, he respects his own work and the work of others, and is also ready to critical assessment of knowledge regarding ethics, economic and environmental priorities in his own or other activities. He knows the limitations of his own knowledge and skills, is ready to constantly improve, update	(K_K01)

	knowledge and raise qualifications in the field of biotechnology	

3.3. Course content (to be completed by the coordinator)

A. Classes, tutorials/seminars, colloquia, laboratories, practical classes

Lecture

1. Introduction to the microbial world. The subject of biotechnology, history of biotechnology
2. General characteristics of microorganisms used in biotechnological processes
3. Screening of microorganisms useful in biotechnological processes
4. Fundamental and modern techniques used in microbial biotechnology
5. General characteristics and classification of bioprocesses
6. Industrial applications of microorganisms (biosynthesis processes, fermentation processes, biotransformation processes)
7. Enzymes and their application in biotechnology
8. Genetic engineering, vectors, transformation
9. GMO - importance and practical application, ethical and social aspects.

Classes

1. Principles of safe work in a laboratory of microbiology. Equipment and working conditions in a microbiological laboratory.
2. Screening of microorganisms from different environments, microbial elimination of toxic industrial dyes.
3. Methods used for microbial identification (pcr, multiplex pcr)
4. Electroporation for improving microbial strains (bacterial transformation)
5. Practical applications – antibacterial and antiviral properties of coatings with bioactive surface

3.4. Methods of Instruction

Lecture: lecture supported by a multimedia presentation
Classes: conducting experiments, group work (problem solving, case study, discussion, text analysis, project work practical project)

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

Learning outcome	Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes)	Learning format (lectures, classes,...)
LO-01- LO-03	*report, oral presentation*	*Lectures, classes*
LO-04- LO-06	*report, observation during classes, oral presentation*	*classes*
LO-07- LO-08	*observation during classes*	*classes*

4.2 Course assessment criteria

FINAL DEGREE IS BASED ON LABORATORY REPORTS AND MULTIMEDIA PRESENTATION

5. Total student workload needed to achieve the intended learning outcomes – number of hours and ECTS credits

Activity	Number of hours
Scheduled course contact hours	10
Other contact hours involving the teacher (consultation hours, examinations)	10
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	120
Total number of hours	140
Total number of ECTS credits	6

* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

Number of hours	-
Internship regulations and procedures	-

7. Instructional materials

Compulsory literature:

1. DŁUGOŃSKI J, ED. "MICROBIAL BIOTECHNOLOGY IN THE LABORATORY AND PRACTICE – THEORY, EXCERCISES AND SPECIALIST LABORATORIES, JAGIELLONIAN UNIVERSITY PRESS, 2021
2. GLAZER A, NAKAIDO H. MICROBIAL BIOTECHNOLOGY. FUNDAMENTALS OF APPLIED MICROBIOLOGY. CAMBIRDGE UNIVERSITY PRESS. CAMBRIDGE NEW YORK, 2.
3. RATLEDGE C, KRISTANSEN B., BASIC BIOTECHNOLOGY, CAMBRIDGE UNIVERSITY PRESS, CAMBRIDGE, 3RD EDITION
4. WOLF K, NONCONVENTIONAL YEASTS IN BIOTECHNOLOGY: A HANDBOOK (ED). BERLIN, SPRINGER, 1996
5. RAVI INDU, MATMA BAUNTHIYAL JYOTI SAXENA ED. ADVANCES IN BIOTECHNOLOGY

Complementary literature:

1.Ravishankar Rai V (ed.) Advances in food biotechnology, Wiley

2.Sibirny A, Fedrovych D, Gonchar M, Grabek-Lejko D (ed) Living organisms and bioanalytical approaches for detoxification and monitoring of toxic compounds, Rzeszow, 2015
3.PUBMED