SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Biotechnological use of bacteria

Educational subject description sheet

Basic information

Field of study Biotechnology	**Didactic cycle** 2024/25
Speciality -	**Subject code** BBTBTjS_D.310.01612.24
Organizational unit Faculty of Biology and Biotechnology	**Lecture languages** english
Study level first cycle (engineering degree)	**Mandatory** Elective subjects
Study form full-time studies	**Block** Major subjects
Education profile General academic	**Disciplines** Biological sciences

Coordinator	Iwona Gientka
Teacher	Iwona Gientka

Period	**Examination**	**Number of ECTS points**
Semester 5	Pass with grade **Activities and hours** Lecture: 15 Laboratory exercises: 15	2

Goals

Code	Goal
C1	The aim of the lectures is to familiarize students with the possibilities of biotechnological use of bacteria, regulation of biochemical pathways conditioning the overproduction of desired metabolites, technology of their production, purification and application. The aim of the exercises is to familiarize students with the biosynthesis of selected industrial metabolites.

Entry requirements

general microbiology, general biotechnology, biochemistry, physicochemical analytics
The student should know the general characteristics of prokaryotes, the basics of biochemistry and biotechnological processes, be able to perform basic physicochemical analyses, know and be able to use basic microbiological techniques.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the lists of prokaryotic organisms in biotechnology	BTj_K3_W06, BTj_K3_W09	Written credit
W2	the mechanisms of regulation of bacterial metabolism in order to overproduce metabolites	BTj_K3_W06, BTj_K3_W08, BTj_K3_W09, BTj_K3_W13_inz	Written credit
W3	the bacteria used in the biotechnological process and the conditions of their cultivation in order to produce the desired metabolite	BTj_K3_W06, BTj_K3_W08, BTj_K3_W09, BTj_K3_W13_inz	Written credit
Skills – Student can:			
U1	carry out the process of obtaining selected biotechnological products with the use of bacteria	BTj_K3_U01_inz, BTj_K3_U06_inz, BTj_K3_U21	Written credit
U2	use basic experimental and analytical techniques important in the control of biotechnological processes involving bacteria	BTj_K3_U01_inz, BTj_K3_U06_inz	Written credit
U3	interpret the results of determinations important in biotechnological processes involving bacteria and formulate conclusions	BTj_K3_U21	Written credit
Social competences – Student is ready to:			
K1	apply knowledge in the microbial and biotechnological laboratory	BTj_K3_K03	Report

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	The student learns the methods and goals of the biotechnological use of bacteria for the overproduction of selected compounds. Overview of the conditions for obtaining selected biotechnological products with the participation of bacteria and the regulation of their metabolism. Traditional and innovative applications of bacteria in various branches of biotechnology.	W1, W2, W3	Lecture

No.	Course content	Subject's learning outcomes	Activities
2.	The student is able to produce and purificate choosen bacterial metabolites. Conducting the processes of biosynthesis and secretion of selected biotechnological products with the participation of bacteria (independent work and in teams), with the analysis of their course (microbiological and physicochemical parameters), calculation of the efficiency of the process, interpretation of results and formulation of conclusions, as well as the practical application of the produced bacterial metabolites.	U1, U2, U3, K1	Laboratory exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture, E-learning - lecture part
Laboratory exercises	Teamwork, Laboratory (experiment), learning by experiment, Observation

Activities	Examination method	Percentage
Lecture	Written credit	50%
Laboratory exercises	Written credit	25%
Laboratory exercises	Report	25%

Activities	Credit conditions
Lecture	Written credit
Laboratory exercises	tests during classes and preparation of a team analysis of a defined experiment

Literature

Obligatory

1. Glazer A.N., Nikaido H. Microbial biotechnology – Fundamentals of Applied Microbiology, Second Edition, Cambridge University Press 2007. eBook available for free.

Optional

1. Supportive materials (review papers, and books' chapters) will be provided by lecturer

Calculation of ECTS points

Activity form	Activity hours*
Lecture	15
Laboratory exercises	15
Preparing a report	5

Preparation for the test	5
Preparation for the exam	10
Student workload	**Hours** 50
Number of ECTS points	**ECTS** 2

* hour means 45 minutes

Effects

Code	Content
BTj_K3_K03	The graduate is ready to for safe work via the selection and application of a proper technique of handling, storing and disposing of laboratory materials (e.g. using proper techniques in terms of handling, storing and disposing of bacteria, chemical substances and dangerous bio-waste);
BTj_K3_U01_inz	The graduate can utilise proper techniques and knowledge related to biotechnology in practice, under the care of a supervisor;
BTj_K3_U06_inz	The graduate can use laboratory equipment in order to gather observations and data
BTj_K3_U21	The graduate can coping with understanding, planning and analysing; being able to interpret and report biological data acquired while working individually and in a group;
BTj_K3_W06	The graduate knows and understands the functions of various cells (prokaryotic and eukaryotic), being able to critically explain, how their properties are related to varying biological functions, knowing how they can be tested experimentally
BTj_K3_W08	The graduate knows and understands the features of cellular metabolism and its control, including the knowledge of certain experimental techniques;
BTj_K3_W09	The graduate knows and understands living organisms and their place in the natural environment, and how they can be used for the good of humanity;
BTj_K3_W13_inz	The graduate knows and understands the importance of processes necessary to asses and initiate research in the field of biotechnology;