

COURSE DESCRIPTION (SYLLABUS)

1.	Course: Industrial Biotechnology
2.	Language of instruction: English
3.	Faculty: Faculty of Biotechnology
4.	Course/module code:
5.	Course/module type (<i>mandatory or elective</i>): elective - choice limited to Industrial and Medical Biotechnology
6.	Programme: Biotechnology
7.	Study cycle (<i>1st/2nd</i>): 1st cycle
8.	Year: 3rd
9.	Semester (<i>autumn or spring</i>): autumn
10.	Form of tuition and number of hours: Lecture: 30 h
11.	Coordinator(s): Marcin ŁUKASZEWICZ, Prof.
12.	Initial requirements (<i>knowledge, skills, social competences</i>): Basic knowledge of biological sciences; namely microbiology, molecular biology and biochemistry.
13.	Objectives: <ul style="list-style-type: none"> • Obtaining by student's knowledge of the basics of industrial biotechnology. • The acquisition by the student's extended knowledge of selected topics in the field of industrial microbiology and biotechnology especially in the areas of the greatest economic importance. • Obtaining the ability to apply a variety of experimental methods needed to work in the biotechnology research and industry.
14.	Content: <ul style="list-style-type: none"> • Biological and biochemical characteristics of selected groups of microorganisms used in industrial processes.

	<ul style="list-style-type: none"> • Biotechnological aspects of the production technology: food (wine, beer, bread, butter, cheese, yogurt), organic compounds (organic solvents, antibiotics, vitamins). • The use of microorganisms for biotransformation of chemical compounds and as bioindicators. • Microbial corrosion. • The basic technological solutions. • Scaling-up biotechnological processes. Bioreactors. Issues associated with magnification scale. • Introduction to organizational and legal issues related to the production (GMP, GLP, HACCP, ISO, PKN). 		
1.	<table border="1"> <tr> <td data-bbox="209 616 970 1856"> <p>Learning outcomes: Student:</p> <ul style="list-style-type: none"> • knows and understands the importance of mathematical and statistical methods needed to describe, interpret phenomena and processes and planning experience, • has a basic knowledge of industrial microbiology and biotechnology, • has an extensive knowledge of the processes and the most important technologies used the main fields of industrial biotechnology, • is familiar with the basic concepts, terms and methods used in the research of industrial biotechnology, • is able to link theoretical knowledge of biochemistry, biotechnology, molecular biology and microbiology with its practical use in industry, • knows the basic rules of health and safety in work and standardization in the industry, • reads and understands the scientific literature in the field of industrial microbiology and biotechnology in English, • can take advantage of the online resources available and the literature to obtain information on industrial biotechnology, • uses appropriate language and scientific terminology • understands the need for continuing self-education including deepening expertise in industrial biotechnology. </td> <td data-bbox="970 616 1422 1856"> <p>Outcome symbols:</p> <p>K1_W01, K1_W02, K1_W03, K1_W04, K1_W06, K1_W08, K1_W09, K1_W10,</p> <p>K1_U03, K1_U04, K1_U08, K1_U09, K1_U12,</p> <p>K1_K01, K1_K02, K1_K04</p> </td> </tr> </table>	<p>Learning outcomes: Student:</p> <ul style="list-style-type: none"> • knows and understands the importance of mathematical and statistical methods needed to describe, interpret phenomena and processes and planning experience, • has a basic knowledge of industrial microbiology and biotechnology, • has an extensive knowledge of the processes and the most important technologies used the main fields of industrial biotechnology, • is familiar with the basic concepts, terms and methods used in the research of industrial biotechnology, • is able to link theoretical knowledge of biochemistry, biotechnology, molecular biology and microbiology with its practical use in industry, • knows the basic rules of health and safety in work and standardization in the industry, • reads and understands the scientific literature in the field of industrial microbiology and biotechnology in English, • can take advantage of the online resources available and the literature to obtain information on industrial biotechnology, • uses appropriate language and scientific terminology • understands the need for continuing self-education including deepening expertise in industrial biotechnology. 	<p>Outcome symbols:</p> <p>K1_W01, K1_W02, K1_W03, K1_W04, K1_W06, K1_W08, K1_W09, K1_W10,</p> <p>K1_U03, K1_U04, K1_U08, K1_U09, K1_U12,</p> <p>K1_K01, K1_K02, K1_K04</p>
<p>Learning outcomes: Student:</p> <ul style="list-style-type: none"> • knows and understands the importance of mathematical and statistical methods needed to describe, interpret phenomena and processes and planning experience, • has a basic knowledge of industrial microbiology and biotechnology, • has an extensive knowledge of the processes and the most important technologies used the main fields of industrial biotechnology, • is familiar with the basic concepts, terms and methods used in the research of industrial biotechnology, • is able to link theoretical knowledge of biochemistry, biotechnology, molecular biology and microbiology with its practical use in industry, • knows the basic rules of health and safety in work and standardization in the industry, • reads and understands the scientific literature in the field of industrial microbiology and biotechnology in English, • can take advantage of the online resources available and the literature to obtain information on industrial biotechnology, • uses appropriate language and scientific terminology • understands the need for continuing self-education including deepening expertise in industrial biotechnology. 	<p>Outcome symbols:</p> <p>K1_W01, K1_W02, K1_W03, K1_W04, K1_W06, K1_W08, K1_W09, K1_W10,</p> <p>K1_U03, K1_U04, K1_U08, K1_U09, K1_U12,</p> <p>K1_K01, K1_K02, K1_K04</p>		
2.	<p>Obligatory and recommended literature:</p> <ul style="list-style-type: none"> • Schlegel H. G., <u>General microbiology</u>; • Bamforth C. <u>Tap into the art and science of brewing</u>. 1998. Plenum Press New York • Waites M.J., et al. <u>Industrial Microbiology: An Introduction</u>. 2001. Wiley. 		

	<ul style="list-style-type: none"> • Baltz R.H. et al. Manual of Industrial Microbiology and Biotechnology, 3rd Edition. 2010 ASM Press. • Scientific journals such as: Trends in Biotechnology, Current Opinion in Biotechnology, Microbiological Reviews, Biotechnology Progress, Journal of Industrial Microbiology and Biotechnology. 	
3.	Methods of verification of the assumed learning outcomes: written exam	
4.	Conditions of earning credits: positive exam result	
5.	Student's workload:	
	Activity	Number of hours for the activity
	Hours of instruction (as stipulated in study programme): • lecture	30 h
	Student's own work: • reading the literature; • preparation for the exam;	60 h
	Total number of hours:	90 h
	Number of ECTS:	4 ECTS