

KARTA PRZEDMIOTU**I. Dane podstawowe**

Nazwa przedmiotu	Technologie i inżynieria bioprosesowa - kurs rozszerzony
Nazwa przedmiotu w języku angielskim	Technologies and bioprocess engineering – extended course
Kierunek studiów	Biotechnologia
Poziom studiów (I, II, jednolite magisterskie)	I
Forma studiów (stacjonarne, niestacjonarne)	stacjonarne
Dyscyplina	nauki biologiczne
Język wykładowy	język angielski

Koordinator przedmiotu/osoba odpowiedzialna	Dr hab. inż. Andrea Baier
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Forma zajęć (<i>katalog zamknięty ze słownika</i>)	Liczba godzin	semestr	Punkty ECTS
Wykład	30	V	10
konwersatorium			
Ćwiczenia	60	V	
Laboratorium			
Warsztaty			
Seminarium			
Proseminarium			
Lektorat			
Praktyki			
zajęcia terenowe			
pracownia dyplomowa			
Translatorium			
wizyta studyjna			

Wymagania wstępne	Knowledge in general microbiology, biochemistry with enzymology, genetic engineering, molecular biology. Ability to think critically. Ability to provide microbiological cultures.
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II. Cele kształcenia dla przedmiotu

Information about techniques used in different fields of biotechnology to produce specific substances used in the production of drugs, food and other industrial products
To acquaint students with traditional methods using microorganisms and their metabolic products
Information about up-stream processes (preparation of biofermentors, inoculum, ingredients of microbial medium)

III. Efekty kształcenia dla przedmiotu wraz z odniesieniem do efektów kierunkowych

Symbol	Opis efektu przedmiotowego	Odniesienie do efektu kierunkowego
WIEDZA		
W_01	The student is able to describe the construction of a typical bioreactor The student describes methods to provide biochemical processes and microbial growth kinetics The student is able to compare cultivation techniques in bioreactors. The student knows principles and criteria for the choice of a bioreactor within a biotechnological process	K_W01
W_02	The student identifies microorganisms used in the production of bioproducts. He is able to name bioproducts obtained by microorganisms	K_W02
W_03	The student has knowledge in basic metabolic processes	K_W08
W_04	The student knows the principles of H&S at working place	K_W09
W_05	The student knows general principles to establish an individual business using knowledge in biotechnology	K_W11
UMIEJĘTNOŚCI		
U_01	The student prepares culture media, knows the influence of medium components on the production of metabolites	K_U01
U_02	The student is able to analyse processes conducted in bioreactors	K_U05
U_03	The student participates in discussion on biotechnology issues using scientific language	K_U08
U_04	prepares an oral presentation in Polish and/or English using specialized terminology	K_U09
U_05	prepares a written study on issues related to biotechnology in Polish and/or English using the scientific language and makes diagrams and calculates microbial growth kinetics	K_U10
KOMPETENCJE SPOŁECZNE		
K_01	The student is open-minded towards new technologies in bioprocess engineering to obtain bioproducts The student systematically actualizes the knowledge about microorganisms and practical possibilities of their application	K_K01
K_02	The students is able to work in a team	K_K02
K_03	The student proceeds according to good practice regulations in the production of pharmaceutical substances and applies H&S procedures	K_K03

IV. Opis przedmiotu/ treści programowe

lecture: Bioreactors as main element in bioprocesses. Classification and basic types of bioreactors. Construction of different bioreactors (submerge, immobilized biocatalysts, plant tissue, solid). Biological basics of microbial processes. Basics of microbial growth. Kinetics of microbial growth. Microbial culture techniques. Engineering processes in biotechnology – stirring, aeration, heat exchange in bioreactors. Sterilization methods of fermentation medium. Control and regulation of processes in bioreactors. Organizational principals of biotechnological production. Extraction and purification of bioproducts. Technologies used to obtain bioproducts – microbial biomass, amino acids, enzymes

lab classes: Bioreactor engineering – methods to assess biochemical processes, kinetic exchange in bioreactors. Extraction and purification of biotechnological products – mechanical separation methods of suspensions and disruption of cells. General technologies used to obtain bioproducts – microbial biomass, amino acids, enzymes.

V. Metody realizacji i weryfikacji efektów kształcenia

Symbol efektu	Metody dydaktyczne (lista wyboru)	Metody weryfikacji (lista wyboru)	Sposoby dokumentacji (lista wyboru)
WIEDZA			
W_01	Discussion conventional lecture	Exam, written test	Evaluated test/written test
W_02	Discussion conventional lecture	Exam, written test	Evaluated test/written test
W_03	Discussion conventional lecture	Exam, written test	Evaluated test/written test
W_04	Laboratory analysis	observation	Observation report
W_05	Conventional lecture	Exam, written test	Evaluated test/written test
UMIĘTNOŚCI			
U_01	Laboratory classes	report	Report printout/file
U_02	Practical classes	Test of practical skills Written test	Evaluated test/written test
U_03	Discussion	presentation	Presentation rating card
U_04	Discussion	presentation	Presentation rating card
U_05	Practical classes	Test of practical skills report	Rating card Report printout/file
KOMPETENCJE SPOŁECZNE			
K_01 K_02 K_03	Laboratory classes	observation	Observation report

VI. Kryteria oceny, wagi

lecture

100% grade from the exam

Lab classes

80% grades from the written tests (3 tests), 10% reports, 10% work during classes

Mark	Evaluation criteria	
Very good (5)	the student realizes the assumed learning outcomes at a very good level	the student demonstrates knowledge of the education content at the level of 95-100%

overgood (4.5)	the student accomplishes the assumed learning outcomes an over good level	the student demonstrates knowledge of the education content at the level of 85-94 %
Good (4)	the student accomplishes the assumed learning outcomes at a good level	the student demonstrates knowledge of the education content at the level of 75-84%
Quite good (3.5)	the student accomplishes the assumed learning outcomes at a quite good level	the student demonstrates knowledge of the education content at the level of 65-74%
sufficient (3)	the student accomplishes the assumed learning outcomes at a sufficient level	the student demonstrates knowledge of the education content at the level of 51-64%
insufficient (2)	the student accomplishes the assumed learning outcomes at an insufficient level	the student demonstrates knowledge of the education content below the level of 51%

VII. Obciążenie pracą studenta

Forma aktywności studenta	Liczba godzin
Liczba godzin kontaktowych z nauczycielem	90
Liczba godzin indywidualnej pracy studenta	160

VIII. Literatura

Literatura podstawowa
Nduka Okafor: Modern Industrial Microbiology and Biotechnology, 2007, Science Publisher M.J. Waites, N.L. Morgan, J.S. Rockey, G. Higton: Industrial Microbiology: An Introduction, 2001, Blackwell Science