KARTA PRZEDMIOTU

I. Dane podstawowe

Nazwa przedmiotu	Inżynieria genetyczna
Nazwa przedmiotu w języku angielskim	Genetic engineering
Kierunek studiów	Biotechnologia
Poziom studiów (I, II, jednolite magisterskie)	I
Forma studiów (stacjonarne, niestacjonarne)	stacjonarne
Dyscyplina	biotechnologia
Język wykładowy	Grupy w języku polskim – język polski Grupy w języku angielskim – język angielski

Koordynator przedmiotu/osoba odpowiedzialna	Dr Elżbieta Kochanowicz

Forma zajęć *(katalog zamknięty ze słownika)*	Liczba godzin	semestr	Punkty ECTS
Wykład	15	IV	5
konwersatorium			
ćwiczenia	30	IV	
laboratorium			
warsztaty			
seminarium			
proseminarium			
Lektorat			
Praktyki			
zajęcia terenowe			
pracownia dyplomowa			
translatorium			
wizyta studyjna			

Wymagania wstępne	Knowledge of biochemistry and genetics. Ability of laboratory work

II. Cele kształcenia dla przedmiotu

Objectives of the course:
• Presenting the principles of gene manipulation and its associated techniques to enable students to understand them.
• Acquainting students with the methodologies of basic genetic engineering through their individual execution.
• Forming skills of observation, asking questions, designing experiments, discuss the results and make proposals
• Developing ability to use specific vocabulary and terms of genetic engineering

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

Symbol	Opis efektu przedmiotowego	Odniesienie do efektu kierunkowego
WIEDZA		
W_01	knows basic terminology used in genetic engineering	K_W01
W_02	Describing the basic techniques of genetic engineering used in recombinant DNA technology in vitro	K_W06
W_03	Provide the possibility of applying the achievements of genetic engineering in practice	K_W07
W_04	has knowledge of fundamental principles of H&S and ergonomics, and displays psychophysical abilities in work environment	K_W09
UMIEJĘTNOŚCI		
U_01	applies basic techniques and research tools used in genetic engineering	K_U01
U_02	Planning simple experiments connected with analysis of nucleic acid	K_U02
U_03	Evaluating the effectiveness of genetic engineering in comparison with conventional technologies receiving genetically modified organisms	K_U05
U_04	learns single-handedly in a targeted manner of issues related to genetic engineering	K_U07
U_05	prepares a written elaboration on issues related with genetic engineering in Polish and/or English using scientific language	K_U10
KOMPETENCJE SPOŁECZNE		
K_01	Awareness of the possibility of practical application of learned techniques to produce genetically modified organisms Openness to new technologies used in genetic engineering	K_K01
K_02	takes care of entrusted equipment, respects own and others work, shows a willingness to solve the tasks collectively and to substantive discussion in the field of genetic engineering	K_K02
K_03	Awareness of ethical issues in relation to the manipulation of genetic material	K_K03

IV. Opis przedmiotu/ treści programowe

Lecture:
Genomes, transcriptomes and proteomes. Different gene cloning strategies. Cloning vectors and their applications. Enzymes for DNA manipulation. Cutting and joining of DNA molecules. Polymerase chain reaction - principles, varieties, examples of applications. Methods for DNA sequencing. Assembles of adjacent sequences. Human genome sequencing project. Library of clones and their application, screening of the libraries by different methods. Labeling of DNA. Genetic and physical mapping of genomes. Determination of gene function. Changing genes: site-directed mutagenesis. Different methods for RNA analysis. Genetic engineering techniques of II and III generation. The use of genetic engineering in practice - genetically modified organisms. qPCR
Classes:
Methods of DNA isolation. Purification of plasmid DNA by alkaline lysis and chromatography. Comparing the purity of isolated DNA preparations obtained by different methods. Determining the efficiency of applied methods. Restriction enzymes. Digestion of isolated plasmid vectors to obtain a linear form. Construction of restriction maps. DNA agarose gel electrophoresis. DNA visualization

and analysis Polymerase chain reaction. Implementation of PCR in temperature gradient. Site-directed mutagenesis by PCR. Primers designing for PCR. Cloning of gene in the plasmid vector. Prepare the ends of the DNA for cloning. Ligation. Preparation of competent E.coli cells. Transformation of bacteria. Analysis of obtained transformants.

V. Metody realizacji i weryfikacji efektów kształcenia

Symbol efektu	Metody dydaktyczne *(lista wyboru)*	Metody weryfikacji *(lista wyboru)*	Sposoby dokumentacji *(lista wyboru)*
WIEDZA			
W_01, W_02 W_03 W_04	conventional lecture, laboratory analysis,	Written exam, test;	evaluated test/exam, protocol
UMIEJĘTNOŚCI			
U_01 U_02 U_03 U_04 U_05	Laboratory classes	observation; test ofpractical skills, report	Report printout, observation report
KOMPETENCJE SPOŁECZNE			
K_01 K_02 K_03	Laboratory classes	Test of practical skills	Report printout

VI. Kryteria oceny, wagi

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 91-100%
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 86-90 %
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 71-85%
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 66-70%
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%

VII. Obciążenie pracą studenta

Forma aktywności studenta	Liczba godzin
Liczba godzin kontaktowych z nauczycielem	45
Liczba godzin indywidualnej pracy studenta	30

VIII. Literatura

Grupy w języku polskim

Literatura podstawowa
1. Węgleński, P. Genetyka molekularna, PWN, 2. Brown, T.A. Genomy, PWN, 3. Allison L.A. Podstawy biologii molekularnej, Wydawnictwo Uniwersytetu Warszawskiego, 4. Kur J. Podstawy inżynierii genetycznej, Wydawnictwo Politechniki Gdańskiej,
Literatura uzupełniająca
1.Słomski R (red) Przykłady analiz DNA, Wydawnictwo Akademii Rolniczej w Poznaniu, 2.Primrose S.B. Twyman R.M. Principles of gene manipulation and genomics, Blackwell Publishing,

Grupy w języku angielskim

Literatura podstawowa
Brown, T.A. Genomes, PWN 2009
Literatura uzupełniająca
Primrose S.B/. Twyman R.M. Principles of gene manipulation and genomics, Blackwell Publishing,