


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


Course title		ECTS code	
Diploma lecture - Essentials of genetic engineering		13.3.0668	
Name of unit administrating study			
null			
Studies			
faculty	field of study	type	pierwszego stopnia
Wydział Chemii	Chemia	form	stacjonarne
		specjalty	chemia biomedyczna, chemia kosmetyków, analityka i diagnostyka chemiczna, chemia żywności
		specialization	wszystkie
Teaching staff			
dr hab. Agnieszka Żylicz-Stachula, profesor uczelni			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		2	
Lecture		classes 30 h	
The realization of activities		tutorial classes 5 h	
classroom instruction		student's own work 15 h	
Number of hours		TOTAL: 50 h - 2 ECTS	
Lecture: 30 hours			
The academic cycle			
2024/2025 summer semester			
Type of course		Language of instruction	
obligatory		polish	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
<ul style="list-style-type: none"> - designing experiments - discussion - group work - multimedia-based lecture - problem solving 		Final evaluation	
		Graded credit	
		Assessment methods	
		<ul style="list-style-type: none"> - (mid-term / end-term) test - graded course credit based on individual grades obtained during the semester 	
		The basic criteria for evaluation	
		final written test consisting of test questions, open tasks and simulation exercises, covering issues mentioned in the lecture's program content final grade according to the scale of grades given in the Study Regulations supplementary written evaluation for students who did not obtain the required 51% in the first term	
Method of verifying required learning outcomes			
Required courses and introductory requirements			
A. Formal requirements			
General Chemistry, Organic Chemistry, Biochemistry, General Microbiology			
B. Prerequisites			
proper use of the chemical/biological terminology and nomenclature, knowledge of the basic functions and structure of the prokaryotic and eukaryotic cell, knowledge of cellular biochemical processes			
Aims of education			
Aims of education			

acquainting students with all issues mentioned in the lecture's program content
 acquainting students with the basic properties of biological macromolecules: DNA, RNA and proteins;
 acquainting students with selected mechanisms of genetic regulation in gene expression;
 acquainting students with the current possibilities, limitations and the anticipated trends in modern genetic engineering and molecular biotechnology

Course contents

genetic engineering and molecular biotechnology: concepts, history, achievements, perspectives, threats; recombinant microorganisms and transgenic animals; structure and applications of GFP; PCR as a DNA amplification method and diagnostic tool (definition, selected modifications and applications); nucleic acid isolation techniques; molecular cloning procedures; basic molecular tools (vectors, polymerases, ligases, nucleases and other DNA modifying enzymes); restriction endonucleases and their applications; methods of introducing recombinant DNA into cells; methods of selecting positive bacterial clones; nucleic acid sequencing by the chain termination method (Sanger sequencing); selected gene expression systems;

Bibliography of literature

Literature required to pass the course

A.2. Literature for individual studies

1. Węgleński, P.: Genetyka molekularna. Wydawnictwo naukowe PWN 2006
 2. Brown, T.A.: Genomy. Wydawnictwo naukowe PWN 2009
- Extracurricular readings
1. Watson, J.D., Myers, R.M., Caudy, A.A., Witkowski, J.A.: Recombinant DNA. Genes and genomes – a short course. 2007.
 2. Buckingham, M.L., Flaws, L.: Molecular diagnostics: Fundamentals, Methods and Clinical Applications. 2007
 3. Glick, B.R., Pasternak, J.J., Patten, C.L.: Molecular biotechnology: Principles and applications of recombinant DNA. 2009

The learning outcomes (for the field of study and specialization)

Knowledge

Understands and describes the structure of DNA, RNA and proteins,
 Understands and describes the processes of replication, transcription and translation,
 Describes selected mechanisms of gene expression regulation,
 Lists, characterizes and understands the methods used in molecular biotechnology and genetic engineering,
 Lists basic molecular tools used in genetic engineering.

Skills

Designs DNA starters and PCR reaction conditions,
 Analyzes DNA sequences,
 Identifies the sequences recognized by restriction endonucleases and anticipates the DNA restriction fragments obtained with these enzymes,
 Lists potential practical applications of the discussed techniques and molecular tools,
 Proposes the use of specific molecular techniques and molecular tools to solve a problem.

Social competence

Understands the need for further education,
 Being cautious and critical when expressing opinions,
 Obtains an awareness of the relationship between human genetic material and human health and life span,
 Realizes and appreciates the possibilities created by modern molecular biotechnology and genetic engineering,
 Understands social, environmental and economic effects and potential risks posed by modern genetic engineering.

Contact

a.zylicz-stachula@ug.edu.pl