

Course title Wykład dyplomowy - Podstawy inżynierii genetycznej/Diploma lecture - Essentials of genetic engineering		ECTS code 13.3.0908	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Chemistry	Bachelor	Full-time studies	
Teaching staff Dr hab. Agnieszka Żylicz-Stachula, prof. UG			
Forms of classes, the realization and number of hours		ECTS credits	
A. Forms of classes, in accordance with the UG Rector's regulations lecture		classes 30 h tutorial classes 5 h student's own work 15 h TOTAL: 50 h - 2 ECTS	
B. The realization of activities In-class learning			
C. Number of hours lecture 30 h			
The academic cycle Third year, summer semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods Lectures including multimodal presentations		Form and method of assessment and basic criteria for evaluation or examination requirements	
		A. Final evaluation, in accordance with the UG study regulations Course completion (with a grade)	
		B. Assessment methods test	
		The basic criteria for evaluation <ul style="list-style-type: none"> • 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 	
Required courses and introductory requirements <p>A. Formal requirements General Chemistry, Organic Chemistry, Biochemistry, General Microbiology</p> <p>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</p>			
Aims of education <ul style="list-style-type: none"> • 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

A. 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

B. 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

Knowledge

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

Skills

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

Social competence

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