

FACULTY OF CHEMISTRY		SUBJECT CARD				
Name of subject in Polish	Inżynieria genetyczna					
Name of subject in English	Genetic Engineering					
Main field of study (if applicable):	Biotechnology					
Specialization (if applicable):						
Profile:	academic					
Level and form of studies:	1 st level, full time					
Kind of subject:	obligatory					
Subject code	BTC017009					
Group of courses	NO					
	Lecture	Classes	Laboratory	Project	Seminar	
Number of hours of organized classes in University (ZZU)			60			
Number of hours of total student workload (CNPS)			120			
Form of crediting			crediting with grade			
For group of courses mark (X) final course						
Number of ECTS points			4			
including number of ECTS points for practical (P) classes			4			
including number of ECTS points for direct teacher-student contact (BK) classes			2			
PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES 1. Basics of molecular biology and biochemistry 2. Basics of laboratory work. 3. Ability to perform basic biochemical calculations, including conversion of mass and molar concentrations						
SUBJECT OBJECTIVES C1 Familiarizing students with basic techniques used for DNA recombination C2 Acquiring the theoretical and practical skills necessary to molecular cloning C3 Familiarizing students with basic expression systems C4 Acquiring the theoretical and practical skills necessary to overexpression of protein in bacteria C5 Familiarizing students with recombinant DNA technologies used in biotechnology medicine, agriculture archaeology C6 Familiarizing students with techniques used for gene/genome structure analysis C7 Familiarizing students with methods needed for analysis of expression and function of genes and genomes						
SUBJECT LEARNING OUTCOMES Relating to skills: PEK_U01 – Student is able to plan and conduct restriction digestion experiment PEK_U02 – Student is able to conduct agarose gel electrophoresis and to interpret the results PEK_U03 – Student is able to plan PCR experiment (starter design, PCR reaction setup) PEK_U04 – Student is able to use DNA isolation kits (Gel-out, Clean-up) PEK_U05 – Student is able to prepare competent bacterial cells PEK_U06 – Student is able to setup and conduct DNA ligation reaction PEK_U07 – Student is able to setup and conduct DNA transfer into bacteria PEK_U08 – Student is able to setup and analyse (SDS-PAGE) overexpression of recombinant protein in bacteria.						

PROGRAMME CONTENT		
Laboratory		Number of hours
Lab 1	Familiarizing students with genetic engineering laboratory course.	6
Lab 2	Digestion of pGEX-2T plasmid vector with <i>Bam</i> HI restriction endonuclease	6
Lab 3	Agarose gel electrophoresis of linearized and dephosphorylated pGEX-2T plasmid vector	6
Lab 4	PCR of EcRDBD and isolation of PCR product – Clean-up protocol	6
Lab 5	Preparation of competent XL1-Blue cells	6
Lab 6	Ligation of pGEX-2T/ <i>Bam</i> HI plasmid vector with EcRDBD fragment digested with <i>Bam</i> HI	6
Lab 7	Identification of bacterial transformants by colony PCR	6
Lab 8	Overexpression of EcRDBD (cloned in pGEX2T) in XL1-Blue cells	6
Lab 9	Analysis of EcRDBD expression using SDS-PAGE	6
Lab 10	Test	6
	Total hours	60
TEACHING TOOLS USED		
N1. Performing experiment N2. Short theoretical introduction to experiment N3. Multimedia presentation N4. Solving questions and problems N5. Preparing reports on the experiments		
EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end))	Learning outcomes number	Way of evaluating educational effect achievement
F1 (laboratory)	PEK_U01- PEK_U08	Final test
F2 (laboratory)	PEK_U01- PEK_U08	Reports on the experiments
F3 (laboratory)	PEK_U01- PEK_U05	Activity and involvement during classes
P (laboratory) = $0,8 \cdot F1 + 0,15 \cdot F2 + 0,05 \cdot F3$ Attendance every class and submission of all the assessment is necessary to pass the course. P (laboratory) = 3,0 if $(0,8 \cdot F1 + 0,15 \cdot F2 + 0,05 \cdot F3) = 60,0 - 70,0$ points 3,5 if $(0,8 \cdot F1 + 0,15 \cdot F2 + 0,05 \cdot F3) = 70,1 - 75,0$ points 4,0 if $(0,8 \cdot F1 + 0,15 \cdot F2 + 0,05 \cdot F3) = 75,1 - 80,0$ points 4,5 if $(0,8 \cdot F1 + 0,15 \cdot F2 + 0,05 \cdot F3) = 80,1 - 85,0$ points 5,0 if $(0,8 \cdot F1 + 0,15 \cdot F2 + 0,05 \cdot F3) = 85,1 - 90,0$ points 5,5 if $(0,8 \cdot F1 + 0,15 \cdot F2 + 0,05 \cdot F3) = 90,1 - 100,0$ points		
PRIMARY AND SECONDARY LITERATURE		

PRIMARY LITERATURE:

- [1] Brown, T.A. "Gene Cloning and DNA Analysis: An Introduction. John Wiley & Sons, 7th edition
- [2] Experiment manuals available on the course-specific website only to qualified students

SECONDARY LITERATURE:

- [1] Voet, D., Voet, J.G. „Biochemistry” Wiley & Sons, Inc., 4th edition
- [2] Brown, T.A. "Genomy" PWN 2018
- [3] Węgleński, P. "Genetyka molekularna" PWN 2012
- [4] Berg, J.M., Tymoczko, J.L., Stryer, L. „Biochemia” PWN 2018
- [5] Berg, J.M., Tymoczko, J.L., Stryer, L. „Biochemistry” W.H. Freeman and Co., New York – 9th edition
- [6] <http://www.blackwellpublishing.com/genecloning/>

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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