



UNIWERSYTET PRZYRODNICZY WE WROCŁAWIU

Molecular biology Educational subject description sheet

Basic information

Field of study Biotechnology		Education cycle 2022/23	
Speciality -		Subject code ND000000NBTS.I20BO.1336.22	
Organizational unit The Faculty of Biotechnology and Food Science		Lecture languages english	
Study level First-cycle (engineer) programme		Mandatory optional	
Study form Full-time		Block major subjects (conducted) in foreign languages	
Education profile General academic		Disciplines Biological sciences	
		Subject related to scientific research Yes	
		Subject shaping practical skills Nie	
Teacher responsible for the subject	Zbigniew Lazar		
Other teachers conducting classes	Zbigniew Lazar, Marta Kuźmińska-Bajor		
Period Semester 6	Examination exam	Number of ECTS points 4.0	
	Activities and hours lecture: 45 laboratory classes: 34		

Goals

C1	During the course, students become familiar with the detailed structure of macromolecules found in the cell and their functions. They learn about instrumental and bioinformatic methods of genome, transcriptome, proteome and metabolome analysis. They plan restrictive analysis as well as primers and PCR conditions. They learn about differences in the regulation of gene expression in Prokaryotes, Arche and Eukaryotes, and the post-transcriptional RNAs and post-translational proteins modifications.
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Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge - Student knows and understands:			
W1	The student knows and understands molecular and cellular basis of functioning of organisms.	NB_P6S_WG02	oral exam, written credit, active participation, report, participation in discussion, performing tasks
W2	The student knows and understands on the molecular level, the principles of functioning of cellular metabolism and the techniques of cellular metabolism control.	NB_P6S_WG05	oral exam, written credit, active participation, report, participation in discussion, performing tasks
W3	The student knows and understands in an advanced level, molecular techniques used in the study of genetic material.	NB_P6S_WG06	oral exam, written credit, active participation, report, participation in discussion, performing tasks
Skills - Student can:			
U1	The student can plan and perform experiments, including the selection of appropriate genetic material for research and interpret the obtained results as well as draw conclusions.	NB_P6S_UW02	observation of student's work, active participation, performing tasks
U2	The student can perform analyzes using molecular biology methods and techniques using appropriate equipment.	NB_P6S_UW03	observation of student's work, active participation, performing tasks
U3	The student can communicate with specialists in the field of molecular biology using specialist terminology.	NB_P6S_UK09	observation of student's work, active participation, performing tasks
U4	The student can plan own scientific and professional development, understands the need to improve knowledge related to molecular biology.	NB_P6S_UU13	observation of student's work, active participation, performing tasks
U5	The student is able to use professional terminology in a foreign language.	NB_P6S_UK11	oral exam, active participation, report, participation in discussion
Social competences - Student is ready to:			

Code	Outcomes in terms of	Effects	Examination methods
K1	The student is ready to critical assessment of own knowledge in the field of molecular biology.	NB_P6S_KK01	observation of student's work, active participation, participation in discussion
K2	The student is ready to follow the principles of professional ethics, including bearing the responsibility for the social effects of the use of molecular biology tools and genetic engineering as well as require this from others.	NB_P6S_KR06	observation of student's work, active participation, participation in discussion

Balance of ECTS points

Activity form	Activity hours*	
lecture	45	
laboratory classes	34	
lesson preparation	10	
consultations	2	
report preparation	8	
exam participation	2	
exam / credit preparation	19	
Student workload	Hours 120	ECTS 4.0
Workload involving teacher	Hours 83	ECTS 3.0
Practical workload	Hours 42	ECTS 1.6

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	W1. Introduction to molecular biology. Chemical structure of nucleic acids and their biological properties. W2. Prokaryotic and eukaryotic chromosomes. W3. Cell cycle and replication mechanism. W4. DNA damage, repair and recombination. W5. Structure of the prokaryotic gene and transcription in Prokaryotes. W6. Structure of the eukaryotic gene and transcription in Eukaryotes. W7. Maturation of RNA transcripts. W8. Transcription regulation mechanisms in Pro and Eukaryotes. W9. Translation - mechanism, forms of regulation, elongation and termination. W10. Post-translational modifications of proteins. W11. Genetic manipulations. Cloning vectors. Application. W12. Methods and techniques in molecular biology. W13. Bacteriophages and eukaryotic viruses and their use in molecular biology. W14. Review of the latest discoveries in the field of molecular biology. W15. Repetitory. Final grading.	lecture
2.	C1. Isolation of yeast genomic DNA. C2. PCR reaction: principle of the method, design of PCR primers and programs. Bioinformatic tools. C3. Isolation of plasmid DNA from bacteria. C4. Restriction analysis and restriction profiles of selected plasmids. C5. Repetitory.	laboratory classes

Course advanced

Teaching methods:

case analysis, text analysis, educational film, problem-solving method, discussion, lecture, classes, blended learning

Activities	Examination methods	Percentage in subject assessment
lecture	oral exam, observation of student's work, active participation, participation in discussion	50%
laboratory classes	written credit, observation of student's work, active participation, report, participation in discussion, performing tasks	50%

Entry requirements

biology, biochemistry

Literature

Obligatory

1. Genes XII, Lewin's, Jones and Bartlett Publishers, Inc, 2017
2. Molecular Biology and Biotechnology, John M Walker, Ralph Rapley, Royal Society of Chemistry, 4th Edition, 2002
3. Molecular Biology of the Cell, Bruce Alberts, Garland Science, 6th Edition, 2017

Kierunkowe efekty uczenia się

Kod	Treść
NB_P6S_KK01	The graduate is ready to critical assessment of own knowledge and skills and seeking experts' opinions
NB_P6S_KR06	The graduate is ready to abide by the principles of professional ethics, including liability for the social consequences of using molecular biology and genetic engineering tools, and require that from others
NB_P6S_UK09	The graduate can communicate with specialists in the field of biotechnology and food technology using specialized terminology
NB_P6S_UK11	The graduate can use foreign language at B2 level of the European Language Description System
NB_P6S_UU13	The graduate can plan the path of own scientific and professional development, understand the need for lifelong learning and the graduate can updating knowledge related to the proffession
NB_P6S_UW02	The graduate can plan and perform experiments, including choosing the correct biological material for research and biotechnological processes, interpret obtained results and draw conclusions
NB_P6S_UW03	The graduate can perform analyzes using chemical, biological and physical methods and techniques from biotechnology and food technology using appropriate equipment
NB_P6S_WG02	The graduate knows and understands molecular and cellular basics of the functioning of organisms
NB_P6S_WG05	The graduate knows and understands at an advanced level, the possibilities of using various organisms and enzymes to carry out biotechnological processes and techniques of cellular metabolism control
NB_P6S_WG06	The graduate knows and understands at an advanced level, molecular techniques used in the analysis of genetic material