

## COURSE DESCRIPTION (SYLLABUS)

1.	Course:  <b>Techniques in Molecular Biology</b>
2.	Language of instruction:  <b>English</b>
3.	Faculty  <b>Faculty of Biotechnology</b>
4.	Course/module code:  <b>29-BT-S1-E4-EnTMB</b>
5.	Course/module type ( <i>mandatory or elective</i> ):  <b>mandatory</b>
6.	Programme:  <b>Biotechnology</b>
7.	Study cycle ( <i>1st/2nd</i> ):  <b>1st</b>
8.	Year:  <b>2nd</b>
9.	Semester ( <i>autumn or spring</i> ):  <b>spring</b>
10.	Form of tuition and number of hours: Lecture: <b>20 h</b> Learning methods: <b>lecture with multimedia presentation</b>
11.	Coordinator(s):  <b>Malgorzata Kwasniak-Owczarek, PhD</b>
12.	Initial requirements ( <i>knowledge, skills, social competences</i> ):  <b>Knowledge about the structure and function of nucleic acids in Prokaryotes and Eukaryotes.</b>
13.	Objectives:  <b>The aim of this course is to explain the principles of the basic techniques of molecular biology.</b>
14.	Content:  <b>The content of the course includes the following issues:</b> <ul style="list-style-type: none"> <li>• isolation, purification, as well as qualitative and quantitative determination of nucleic acids;</li> <li>• enzymes for DNA manipulation (polymerases, nucleases, restriction enzymes,</li> </ul>

	<p>ligases);</p> <ul style="list-style-type: none"> <li>• gene cloning (types of vectors and methods of introducing foreign DNA into cells);</li> <li>• PCR and qRT-PCR methods;</li> <li>• nucleic acids hybridization (hybridization probes, Northern Blot, Southern Blot, dot blot);</li> <li>• genomic and cDNA libraries;</li> <li>• DNA sequencing (standard methods of sequencing, next-generation sequencing);</li> <li>• basic information about global transcriptomics, proteomics and metabolomics approaches, as well as methods for validation of interactions between molecules.</li> </ul> <p>The course includes also presentations of short tutorial videos as well as solving of tasks concerning techniques of molecular biology.</p>																										
15.	<table border="1"> <thead> <tr> <th data-bbox="207 584 970 629">Learning outcomes:</th> <th data-bbox="970 584 1422 629">Outcome symbols:</th> </tr> </thead> <tbody> <tr> <td data-bbox="207 629 970 674">Student:</td> <td data-bbox="970 629 1422 674"></td> </tr> <tr> <td data-bbox="207 674 970 786"> <ul style="list-style-type: none"> <li>• knows the basic concepts, terms and research methodology used in molecular biology;</li> </ul> </td> <td data-bbox="970 674 1422 786">K1_W06</td> </tr> <tr> <td data-bbox="207 786 970 875"> <ul style="list-style-type: none"> <li>• knows basic techniques and research tools used in molecular biology;</li> </ul> </td> <td data-bbox="970 786 1422 875">K1_W08</td> </tr> <tr> <td data-bbox="207 875 970 1010"> <ul style="list-style-type: none"> <li>• is able to link theoretical knowledge of molecular biology with its practical application in industry and health care;</li> </ul> </td> <td data-bbox="970 875 1422 1010">K1_W09</td> </tr> <tr> <td data-bbox="207 1010 970 1189"> <ul style="list-style-type: none"> <li>• is familiar with the basic principles of health and safety and ergonomics procedures in the laboratory, know procedures of work with genetically modified organisms;</li> </ul> </td> <td data-bbox="970 1010 1422 1189">K1_W10</td> </tr> <tr> <td data-bbox="207 1189 970 1279"> <ul style="list-style-type: none"> <li>• applies basic molecular biology techniques necessary for studying biological processes;</li> </ul> </td> <td data-bbox="970 1189 1422 1279">K1_U01</td> </tr> <tr> <td data-bbox="207 1279 970 1368"> <ul style="list-style-type: none"> <li>• has skills to perform a genetic modification of microorganisms and cells of higher organisms;</li> </ul> </td> <td data-bbox="970 1279 1422 1368">K1_U02</td> </tr> <tr> <td data-bbox="207 1368 970 1503"> <ul style="list-style-type: none"> <li>• understands the need for continuing education throughout the whole life, including broadening knowledge about new techniques;</li> </ul> </td> <td data-bbox="970 1368 1422 1503">K1_K01</td> </tr> <tr> <td data-bbox="207 1503 970 1637"> <ul style="list-style-type: none"> <li>• recognizes the importance of knowledge and expert opinions in solving cognitive and practical problems;</li> </ul> </td> <td data-bbox="970 1503 1422 1637">K1_K02</td> </tr> <tr> <td data-bbox="207 1637 970 1727"> <ul style="list-style-type: none"> <li>• understands the need for careful planning of tasks and scientific experiments;</li> </ul> </td> <td data-bbox="970 1637 1422 1727">K1_K03</td> </tr> <tr> <td data-bbox="207 1727 970 1816"> <ul style="list-style-type: none"> <li>• recognizes and addresses the ethical problems associated with biotechnology;</li> </ul> </td> <td data-bbox="970 1727 1422 1816">K1_K04</td> </tr> <tr> <td data-bbox="207 1816 970 1921"> <ul style="list-style-type: none"> <li>• knows and follows the rules of health and safety at work.</li> </ul> </td> <td data-bbox="970 1816 1422 1921">K1_K05</td> </tr> </tbody> </table>	Learning outcomes:	Outcome symbols:	Student:		<ul style="list-style-type: none"> <li>• knows the basic concepts, terms and research methodology used in molecular biology;</li> </ul>	K1_W06	<ul style="list-style-type: none"> <li>• knows basic techniques and research tools used in molecular biology;</li> </ul>	K1_W08	<ul style="list-style-type: none"> <li>• is able to link theoretical knowledge of molecular biology with its practical application in industry and health care;</li> </ul>	K1_W09	<ul style="list-style-type: none"> <li>• is familiar with the basic principles of health and safety and ergonomics procedures in the laboratory, know procedures of work with genetically modified organisms;</li> </ul>	K1_W10	<ul style="list-style-type: none"> <li>• applies basic molecular biology techniques necessary for studying biological processes;</li> </ul>	K1_U01	<ul style="list-style-type: none"> <li>• has skills to perform a genetic modification of microorganisms and cells of higher organisms;</li> </ul>	K1_U02	<ul style="list-style-type: none"> <li>• understands the need for continuing education throughout the whole life, including broadening knowledge about new techniques;</li> </ul>	K1_K01	<ul style="list-style-type: none"> <li>• recognizes the importance of knowledge and expert opinions in solving cognitive and practical problems;</li> </ul>	K1_K02	<ul style="list-style-type: none"> <li>• understands the need for careful planning of tasks and scientific experiments;</li> </ul>	K1_K03	<ul style="list-style-type: none"> <li>• recognizes and addresses the ethical problems associated with biotechnology;</li> </ul>	K1_K04	<ul style="list-style-type: none"> <li>• knows and follows the rules of health and safety at work.</li> </ul>	K1_K05
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16.	<p>Recommended literature:</p> <ul style="list-style-type: none"> <li>• “Genomes 3” Terry A. Brown, Garland Science Publisher, 2006;</li> </ul>																										

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17.	Methods of verification of the assumed learning outcomes: <b>written test</b>	
18.	Conditions of earning credits: <b>positive test result</b>	
19.	Student’s workload:	
	Activity	Number of hours for the activity
	Hours of instruction (as stipulated in study programme) : • lectures and consultations	20 h
	Student’s own work: • reading set literature • preparing for the exam	20 h
	Total number of hours	<b>40 h</b>
	Number of ECTS	<b>2 ECTS</b>