

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Principles of Biotechnology</b>		Code <b>1010702221010700058</b>
Field of study <b>Chemical Technology</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>Polymer Technology</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>-</b> Laboratory: <b>30</b> Project/seminars: <b>-</b>		No. of credits <b>6</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>6 100%</b> <b>6 100%</b>
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Ewa Kaczorek email: Ewa.Kaczorek@put.poznan.pl tel. 61-665-3688 Faculty of Chemical Technology ul. Berdychowo 4 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Student should have a basic knowledge of biology.
2	<b>Skills</b>	Student is able to seek information from the indicated sources, properly interprets and draws conclusions. Student knows how to use the information assimilated from the textbook.
3	<b>Social competencies</b>	Student should understand the need for further self-learning.
<b>Assumptions and objectives of the course:</b> Mastering knowledge on the conduct of biotechnological processes. To become acquainted with the possibilities of biotechnology applications in various fields of economic life.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Student has knowledge of complex biotechnology processes involving correct selection of materials, raw materials, apparatus and equipment applied in the processes of neutralization and recovery and planning of laboratory experiments and drawing up the acquired results - [K_W03] 2. Student has knowledge of materials, raw materials, products and biotechnological processes - [K_W05] 3. Student has expanded knowledge about environmental protection associated with chemical processes and using their in a solving of biotechnological methods - [K_W08] 4. Student has an established expertise in the field of safety and health at work in biotechnology - [K_W10]		
<b>Skills:</b> 1. Student has skills to obtain the necessary information from the literature and other sources related to the biological sciences, the ability to link them with other sciences - [K_U01] 2. Student can independently determine the direction of further education - [K_U05] 3. Student uses correctly the terminology of biotechnology - [K_U08] 4. Student is able to apply the acquired knowledge in order to develop a biotechnology process - [K_U11]		
<b>Social competencies:</b>		

1. Student understands the need for self-study and improve their professional competence - [K\_K01]
2. Student is aware of the importance of microorganisms in the environment and biotechnological processes - [K\_K02]
3. Student understands the importance of biotechnology in production of chemicals - [K\_K01, K-K02]

### Assessment methods of study outcomes

The lectures end with an exam. Laboratory assessment on the basis of the current work in the laboratory and the test checking the knowledge gained during laboratories.

### Course description

The course covers the following topics related to conducting biotechnological processes and their use in various branches of industry. These issues in particular concern: the history of biotechnology and its divisions, obtaining microorganisms for biotechnological processes, methods of cultivation of microorganisms: batch, fed-batch, continuous cultures; biocatalysis: the biochemistry of enzymes, enzymatic reactions and the factors determining its course, reaction kinetics, production and purification of enzymes, a class of enzymes, the use of industrial enzymes. Moreover, industrial microorganisms - technological and genetic characteristics. Fundamentals of genetic engineering. Biotechnology in environmental protection: bioremediation and composting, bio-fuels. Prospects for the development of biotechnology in the field of chemistry.

### Basic bibliography:

1. W. Bednarski, J. Fiedurka ?Podstawy biotechnologii przemysłowej? Wydawnictwo Naukowo-Techniczne
2. A. Chmiel ?Biotechnologia? Wydawnictwo Naukowe PWN
3. A. Jędrzak ?Biologiczne przetwarzanie odpadów? Wydawnictwo Naukowe PWN
4. E. Kołakowski, W. Bednarski, S. Bielecki ?Enzymatyczna modyfikacja składników żywności? Wydawnictwo Akademii Rolniczej w Szczecinie, Szczecin 2005.
5. Z. Libudzisz, K. Kowal ?Mikrobiologia techniczna? Wydawnictwo Politechniki Łódzkiej, Łódź, 2000.

### Additional bibliography:

1. M. K. Błaszczak ?Mikroorganizmy w ochronie środowiska? Wydawnictwo Naukowe PWN
2. E. Klimiuk, M. Łebkowska ?Biotechnologia w ochronie środowiska? Wydawnictwo Naukowe PWN, Warszawa 2003
3. S. Malepszy ?Biotechnologia roślin? Wydawnictwo Naukowe PWN Warszawa 2004

### Result of average student's workload

Activity	Time (working hours)
1. lecture	30
2. consultation to the lecture	20
3. laboratory	30
4. preparation for laboratory	30
5. consultation to the laboratory	13
6. exam preparation	25
7. exam	2

### Student's workload

Source of workload	hours	ECTS
Total workload	150	6
Contact hours	95	0
Practical activities	30	0