



### Program of Education

1.	<b>Field of study</b>	<b>Biotechnology</b>
2.	Study status	Full-time studies
3.	profile of education	academic

### Learning outcomes

4.	Description of assumed learning outcomes	<a href="#">enclosure no 1</a>
5.	Description of assumed learning outcomes connected with the qualification that entitle the alumni to practice as a teacher	
6.	Description of assumed learning outcomes connected with the achieving of the engineering competences	
7.	Model learning outcomes	

### Program of study

8.	The connections between the specialization and strategy of development, including the mission of the University	<p>The education within the specialization is convergent with the operational aims, outlined in the strategy of development of the University of Silesia for 2012-2020, especially those referring to the operational aim: innovative education and modern teaching offer. The internationalization and mobility in the educational process, realized mainly due to LPP Erasmus program, cover both the scientific and educational trips of Polish students and academic teachers to numerous universities in Europe and increasing mobility in the opposite direction.</p> <p>Incessant increase in the quality of education is achieved, among others, by the development of didactic competences of the academic teachers and internal system of ensuring high-quality education. Valuable contribution to the increase in education quality is also realized by effective support of a standard didactic offer by projects financed by European Social Fund, e.g. projects for commissioned specialties. The offer of educational program of this specialization is constantly modified and updated to follow, to the greatest extent, the expectations of a local and global labor markets. This is possible, mainly, thanks to an activation of the cooperation with the local environment, especially with employers from biotechnological sector. The educational program of this specialization is regularly consulted with the employers. Our high-quality education is supported by a close connections with researches conducted by the scientists of the Faculty of Biology and Environmental Protection. Most of them reach an international level.</p>
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9.	Form of studies	Full-time studies
10.	Number of semesters	4
11.	Number of ECTS credits required to achieve the qualification adequate for the level of education	120
12.	Area (or areas of education), the specialization belongs to	P
13.	Percentage of ECTS credits for each area of education the learning outcomes refer to in relations to the whole number of ECTS credits.	100%
14.	Disciplines of science or art the learning outcomes refer to	Natural science
15.	Degree	Master of Science
16.	Specializations	Plant biotechnology Environmental biotechnology
17.	Description of educational modules (including assumed learning outcomes and number of ECTS credits and methods of verification of the assumed effects achieved by students)	<a href="#">Enclosure 2</a>
18.	Study schedule	Enclosure no 3 – <a href="#">for edition 2015/16</a>
19.	Requirements for graduating from the determined specialization	Enclosure no 3a
20.	The arrangement of the procedures of achieving the diploma	<a href="#">Enclosure no 4</a>
21.	Percentage of ECTS credits obtained within the frames of facultative modules in relations to the whole ECTS credit number.	78.33%
22.	Total number of ECTS credits that a student has to obtain from the courses requiring a direct participation of academic teachers and students	120
23.	Total number of ECTS credits that a student has to obtain within the frames of courses on fundamental science	4
24.	Total number of ECTS credits that a student has to obtain within the frames of practical courses including laboratory and project classes.	62
25.	Minimal number of ECTS credits that a student has to obtain participating in educational modules within the frames of academic classes or studying other specialization	0
26.	Minimum number of ECTS credits that a student has to obtain participating in physical education classes	-
27.	Range, rules and form of apprenticeship	Enclosure no 5
28.	Minimum personnel	Enclosure no 6
29.	Rate of minimum personnel to the number of students	46 persons (as at the 01.10.2011) in relations to 267 students of the first-cycle studies and 185 students of the second-cycle studies – specialization: biotechnology (as at the 18.11.2011).



**Additional information**

30.	GENERAL CHARACTERISTICS OF THE specialization	<p>During the second cycle-studies in biotechnology, completed by the defense of master thesis, students learn, under the supervision of the promoter, how to pose and solve problems concerning plant and environmental biotechnology and conduct scientific research. Within the frame of chosen department students take part in Specialization laboratories and MSc laboratories as well as Specialization and MSc seminars. The master project is the first one that students conduct, to great extent, by themselves and it is closely related to the research profile of the department. Specialization and MSc laboratories which are crucial in this process take place in modern, fully equipped departmental laboratories. Specialization and MSc seminars provide theoretical support, necessary for a proper realization of the master project. The aim of these seminars is to teach students how to plan the scientific experiments as well as how to prepare, discuss and present the results of research. Additionally, each student acquires advanced knowledge taking part in the obligatory modules: bioinformatics, bioethics, statistical methods in natural sciences, plant and microbial biotechnology. Apart from the obligatory modules, number of facultative modules enables students to individualize the course of studies according to their personal interests and chosen specialization. Qualifications acquired at this field of study are the basis for applying for mid-level managerial posts in laboratories and institutions connected with food and pharmaceutical industry, as well as in the area of health care, environmental protection, plant breeding, pest control and in similar branches of science and economy. The second-cycle studies also prepare the graduates to continue their education at the next level of education i.e. PhD studies in the same or similar area.</p>
31.	General characteristics of the specialization	<p><u>Plant biotechnology:</u> within 2 year study numerous obligatory and facultative modules are offered to the students of this specialization, including: GMO-benefits and threats, Molecular cytogenetics, Plant genomics, DNA markers, Plant organ growth modeling, Physiological basis for pharmaceutical action, Patch-clamp technique in the study of plant cells, Histochemical and immunohistochemical techniques. Profile of a graduate: graduates of this specialization acquire reliable and recent knowledge about the molecular basis of biotechnological processes, supporting the methods of plant breeding for the purposes of modern agriculture and other areas of industry (food industry, manufacturing and pharmaceutical industry). Practical, specialist qualifications of the</p>



		<p>graduates refer to handling advanced equipment of biotechnological laboratory as well as applying basic and advanced techniques used in plant biotechnology. The graduate of this specialty possess the knowledge and practical skills enabling them to take up a job in the developing sector of modern agriculture.</p> <p><u>Environmental biotechnology</u>: within 2 year study numerous obligatory and facultative modules are offered to the students of this specialization, including: Environmental biotechnology, Phytoremediation, Liquid chromatography in environmental biotechnology, Food microbiology and nutritional physiology, Industrial microbiology, Physiology of adaptation to the environment and Histochemical and immuno-histochemical techniques.</p> <p>Profile of a graduate: this specialty meets the needs of our region and local labor market and the program of education is consistent with current assumption of national politics in relation to environmental protection. The graduate is well prepared, both practically and theoretically, to the application of specific biotechnological techniques in recognition and setting of biological processes in various environments. A graduate is ready to take up a job in the institutions applying and introducing modern technologies, based on the utilization of plants and microorganisms and their enzymes. The skills acquired during the studies enable the employment in environmental and diagnostic laboratories as well as in research and developmental institutions.</p>
32.	Matrix of the learning outcomes (coverage of specialization effects by module ones)	<a href="#">Enclosure no 7</a>
33.	Description of scientific activity of the Faculty in an appropriate scientific area	Enclosure no 8
34.	The way of considering of the results of graduates' careers monitoring	enclosure no 9
35.	The way of considering of the results of analysis of the consistence of assumed learning outcomes with the needs of labor market.	Enclosure no 10
36.	The way of application of international models	Enclosure no 11
37.	The way of cooperation with external stakeholders	Enclosure no 12
38.	Description of internal system of education quality	Enclosure no 13
39.	[optionally:] description of requirements of distance learning	Enclosure no 14
40.	[optionally, especially for second-cycle studies] description of learning outcomes acquired during earlier stages of learning, required from a candidate to apply to this specialization.	Enclosure no 15