Annex to Resolution No. 80 of the Senate
of the University of Lodz
dated 15 March 2021

CURRICULUM
of the BioMedChem Doctoral School
of the University of Lodz
and Lodz Institutes of the Polish Academy of Sciences

for the academic year 2021/2022

University of Lodz
Lodz 2021

a) Name of the doctoral school

BioMedChem Doctoral School of the University of Lodz and Lodz Institutes of the Polish Academy of Sciences, hereinafter referred to as BioMedChem Doctoral School of the University of Lodz.

b) A concise description of the doctoral school with a statement of learning objectives

The BioMedChem Doctoral School of the University of Lodz is an important contribution to the process of enhancing the quality of advanced education at the university level. It brings together doctoral students from the following disciplines: biological sciences, medical sciences, and chemical sciences. The program gives the doctoral student the opportunity to develop complex skills at an advanced level in the area related not only to the process of completing the doctoral dissertation, but also covering professional training (supporting the research workshops and improving qualifications in teaching) and personal development (soft competencies, including training in active career planning and development of creative problem solving). These skills are necessary not only for successful completion of training in the Doctoral School, but also for career advancement.

The aim of the training is to broaden and deepen the knowledge of doctoral students in their chosen scientific discipline in an interdisciplinary environment that enables them to place the competencies related to a given scientific discipline in a broader context. The knowledge and skills acquired during the education will prepare the doctoral student to independently plan, design and conduct research within the framework of the Individual Research Plan – IPB. Doctoral students who complete their training at the Doctoral School will be prepared to critically evaluate the results of their research, which form the basis of scientific publications, as well as to present their findings to the international scientific community. The aim of the course is to prepare a doctoral student for teaching at the university level, where they can combine the acquired scientific knowledge with the use of the latest methods of communication. Graduates of the Doctoral School will acquire competencies that will enable them to engage in individual and team research, conducted in national and international research teams, resulting in responsible application of the acquired knowledge and research results in an innovative economy and for the benefit of society.

c) indication of the academic degree obtained by the graduate

(1) a PhD of exact and natural sciences in the discipline of biological sciences or

(2) a PhD of exact and natural sciences in the discipline of chemical sciences or

(3) a PhD of medical sciences and health sciences in the discipline of medical sciences.

d) description of the entry requirements, expected competences of the candidate expressed in the language of the learning outcomes

Candidate:

- Refers to issues in biological sciences or chemical sciences or medical sciences at level 7 of the Polish Qualification Framework;
- precisely formulates and exhaustively expresses thoughts and judgements about the conducted scientific research, using specialized terminology;
- characterizes and uses basic techniques and tools used in the study of the chosen discipline;
- describes the principles of research ethics, particularly respect for the work of others;
- demonstrates proficiency in English to study world literature in the leading scientific discipline and planned personal research.
- justifies the need to continually expand knowledge and implement new methods in scientific research.

e) indication of the fields and scientific disciplines to which the learning outcomes refer

Areas: **1.** Exact sciences and natural sciences, **2**. Medical sciences and health sciences
Disciplines: **1a**. biological sciences; **1b**. chemical sciences; **2a**. medical sciences.

f) description of learning outcomes for the BioMedChem Doctoral School of the University of Lodz, corresponding to characteristics of a second degree at level 8 of the Polish Qualification Framework

Explanation of symbol designations: BMC designation of directed learning outcomes for the BioMedChem Doctoral School of the University of Lodz. Then, after the underline, the letter designation of the effect group: W – the knowledge category, U – the skills category, K – the competence category and two digits indicating the number of the learning outcome. The code designations of the PRK description component are in accordance with the Annex to the Regulation of the Ministry of Science and Higher Education of 14 November 2018. (Dz. U. of 2018, item 2218): P8S = level 8, characteristics typical of higher education qualifications: WG = knowledge – depth and breadth, WK = knowledge – context, UW = skills – knowledge application, UK = skills – communication, UO = skills – work organization, UU = skills – learning, KK = social competence – evaluation (critical), KO = social competence – responsibility, KR = social competence – professional role, BMC – BioMedChem Doctoral School of the University of Lodz

Symbol of the learning effect	Learning outcomes describing the curriculum	PRK code level 8
KNOWLEDGE - The graduate knows and understands:		
BMC_W01	theoretical foundations, general issues and selected specific issues of the world achievements in the field of discipline chosen from among disciplines: biological sciences; chemical sciences; medical sciences, to the extent enabling revision of the existing concepts and theories	P8S_WG
BMC_W02	major trends in the development of a leading discipline in the biological sciences, chemical sciences or medical sciences	P8S_WG
BMC_W03	methodology and principles of planning advanced scientific research appropriate for the discipline selected from among the following disciplines: biological sciences; chemical sciences; medical sciences	P8S_WG
BMC_W04	economic, legal, ethical and other considerations for research activities	P8S_WK
BMC_W05	rules of scientific research financing, obtaining research projects, including projects carried out in international teams; sources of financing and applicable procedures (grant application, application assessment)	P8S_WK
BMC_W06	principles and methods for the preparation and evaluation of scientific publications and research projects in accordance with the principle of functioning of open science	P8S_WK
BMC_W07	principles of commercialization of research results and transfer of knowledge to practical applications;	P8S_WK
BMC_W08	modern, innovative methods, concepts and tools for teaching and popularization of science in a discipline selected from among the following disciplines: biological sciences; chemical sciences; medical sciences	P8S_WK
SKILLS - The graduate is able to:		
BMC_U01	use knowledge from different fields of science to creatively identify, formulate and innovatively solve complex problems or perform tasks of research, interdisciplinary in nature, in particular: define the purpose and subject of research, formulate a research hypothesis; develop research methods, techniques and tools and creatively apply them and make conclusions on the basis of research results	P8S_UW
BMC_U02	make a critical analysis and evaluation of the results of research, expert activities and other works of a creative nature and their contribution to the development of science	P8S_UW
BMC_U03	evaluate the possibility of transferring the results of research work to the economic and social sphere and initiate actions to realize such transfer	P8S_UW
BMC_U04	disseminate research results, mainly in the form of original scientific publications, as well as in popular science forms	P8S_UK
BMC_U05	initiate debate and participate in scientific discussion	P8S_UK
BMC_U06	speak a foreign language to the extent necessary to participate	P8S_UK

	in the international scientific community, in particular through participation in conferences, seminars, workshops, scientific expeditions or internships abroad	
BMC_U07	prepare an application for funding of a research project	P8S_UO
BMC_U08	plan and carry out individual and team research projects, also in an international environment	P8S_UO
BMC_U09	act for their own development and inspire and organize the development of others, among others, during teaching activities and activities related to the dissemination of knowledge	P8S_UU
BMC_U10	develop and implement teaching activities using modern, innovative methods and tools	P8S_UU
SOCIAL COMPETENCES - The graduate is prepared to:		
BMC_K01	critically evaluate achievements in a scientific discipline selected from among the following disciplines: biological sciences, chemical sciences, medical sciences and own contribution to the development of these disciplines	P8S_KK
BMC_K02	recognition of the importance of knowledge in solving cognitive and practical problems, including those of an interdisciplinary nature	P8S_KK
BMC_K03	fulfil social obligations of researchers, providing society with information and opinions resulting from scientific achievements within the scope of a scientific discipline selected from among the following disciplines: biological sciences, chemical sciences, medical sciences, as well as involve in educating specialists and undertaking activities leading to the development of a knowledge-based civil society	P8S_KO
BMC_K04	think and act in an entrepreneurial way, create new ideas and seek innovative solutions, undertake intellectual challenges in the academic and public sphere and bear responsibility for the consequences of their decisions	P8S_KO
BMC_K05	effectively use their knowledge and skills in professional activities	P8S_KR
BMC_K06	respect the principles of public ownership of research results with respect to the principles of legal protection of intellectual property	P8S_KR

g) education plan (information about classes in each year, their number of hours and forms)

COMPULSORY CLASSES (270 hours)							
Type of classes		**Number of hours total**	**Form of classes**	**Number of hours per year**			
				I	**II**	**III**	**IV**
Seminar Student – Master:	Academic mentoring	120	Seminar [1]	20	20	20	20
	Tutoring			-	15	15	10
IPB interdisciplinary progress seminar		20			10	-	10
Higher education didactics		20	**Lecture** [2] / Specialized classes	**8**/12	-	-	-
Science funding and knowledge transfer		20		**8**/12	-	-	-
Ethical and legal aspects of scientific research		20		**12**/8	-	-	-
Apprenticeships: • In the form of teaching or participating in the teaching of classes, min. 20 mandatory teaching hours • the form of the remaining 40 hours of internship is decided by the Director of the Doctoral School in consultation with the Advisor		60	-	10	25	25	-
TOTAL:		**260**		**90**	**70**	**60**	**40**

COMPULSORY COURSES OF CHOICE (min. 96 hours) The choice of the type of course is made in consultation with the advisor. These classes must serve to broaden knowledge or develop competencies necessary for the doctoral student's academic work.						
MODULE 1: Classes developing professional competencies, expanding knowledge and practical skills – min. 36 hours						
			I	**II**	**III**	**IV**
Methods of Statistical Analysis (core course) in the BioMedChem sciences	12	Specialized classes	-	12		-
Methods for advanced statistical analysis in the BioMedChem sciences	12		-	12		-
Bibliographic database management / Specialized databases	12		-	12		-
Public speaking techniques	12		-	12		-
Commercialization of research results	12		-	12		-
An introduction to effective publishing	12		-	12		-
Other *(according to the offer for a given academic year)*	12		-	12		-
MODULE 2: Classes developing personal and social competencies – min. 36 hours						
Fundamentals of science communication	12	Specialized classes	-	12		-
Workshops on creativity and innovation	12		-	12		-
Vocal emission	12		-	12		-
Workshops on IT tools and gamification	12		-	12		-
E-learning and blended learning techniques	12		-	12		-
Other *(according to the offer for a given academic year)*	12		-	12		-
MODULE 3: Interdisciplinary classes – min. 24 hours						
Language of science (Specialised language)	24	Seminars/ Lectures	-	24		-
Interdisciplinary classes for doctoral students	12			number of hours in the course programme, min. 12 hours		
Interdisciplinary monographic lectures	12		-			
Other *(according to the offer for a given academic year)* [3]	12		-	12		
		TOTAL:	**-**	**96**		
			I	**II**	**III**	**IV**
TOGETHER IN THE COURSE OF EDUCATION :	**356 hours of classes including:** mandatory – 260 h elective – 96 h		**90**	**70**	**60**	**40**
			-	**96**		
OBLIGATORY DEVELOPMENT ACTIVITIES related to the discipline of the dissertation						
Active participation (poster or oral presentation) in a scientific conference			min. 3 conferences, including min. 1 international			
Specialized training (min. 1 week) at home or abroad			min. 1 training			

[1] The Student-Master Seminar includes: 20 hrs/year with Advisor (Academic Mentoring) + 10 hrs/year with Specialist (Tutoring). Meetings with the Specialist, as advised by the Advisor, may be initiated independently or can be carried out during organized meetings, guest seminars, webinars, etc. The aim of the adopted solution is the academic activation of PhD students, searching for events, establishing national and international relations and cooperation. If confirmation cannot be obtained from the Specialist, participation in the Student-Master Seminar is confirmed by the Advisor. All meetings must be documented on a course sheet, a specimen of which is given to the doctoral student in the first month of training by the school secretary.

[2] Classes common to doctoral students at all doctoral schools of the University of Lodz.

[3] Interdisciplinary classes offered by *"Visiting Professors"*, university-wide lectures; it is also possible to choose classes offered for PhD students at another university.

Credit for elements of the curriculum

The BioMedChem Doctoral School of the University of Lodz does not use the ECTS credit system and the completion of the curriculum is carried out on an hourly basis. The credit requirements for the course are determined by the teacher in consultation with the doctoral students at the beginning of the course.

h) description of individual subjects or modules of the educational process

Course descriptions for each course as required by the BioMedChem Doctoral School of the University of Lodz are available prior to the start of classes in the USOS system.

i) description of the relationship between the learning outcomes defined in point f and the learning outcomes defined for individual subjects

The learning outcomes defined in paragraph f of this document are consistent with the learning outcomes of the individual modules and subjects included in the curriculum. The relationship between the learning outcomes defined for the doctoral school curriculum and the learning outcomes defined for individual subjects or modules of the educational process can be found in **Table 1**.

j) description of how the learning outcomes of the programme are to be verified, with reference to specific subjects or modules in the educational process

The learning outcomes are checked at the end of a cycle of classes in each subject provided in the programme. They can be verified in the form of:

- a conversation about the content presented in class;
- preparation by a student of a written assignment in the form of a short essay on a topic indicated by the lecturer within the scope of the course;
- preparation by a student of a multimedia project / presentation on a topic indicated by the lecturer within the scope of the classes;
- a test requiring doctoral students to present in writing selected issues within the scope of the course.

The lecturer decides on the choice of one of the above forms of course credit.
The form of credit for each course is known to doctoral students prior to the course cycle and is written in the syllabus.
The test of the results of the doctoral student's research is (in 2nd and 4th year) a presentation at **the IPB Interdisciplinary Progress Seminar**, in the form of a public presentation of the student's own research hypotheses, methods and conclusions.

In order to complete a year, a student must obtain credit for all courses included in the educational plan for a given year, according to the choice made by the doctoral student.

k) possible timetable of visiting lecturers

There is no fixed schedule for visiting lecturers. Doctoral students have the opportunity to participate in optional classes conducted by foreign scientists employed by the University as *"Visiting Professors".* The offer for the academic year depend on the schedule of visiting scholars from abroad.

l) determining the scope, rules and forms of internship

Participants in the doctoral school are required to complete an internship of 60 hours in the form of teaching or participating in the teaching of classes, min. 20 mandatory teaching hours. The form of the remaining 40 hours of internship is decided by the Director of the Doctoral School in consultation with the Advisor In the first year, attendance only is recommended for teaching classes.

Internships will be conducted in accordance with the discipline of doctoral studies or in a related discipline pursued within the BioMedChem Doctoral School of the University of Lodz.
A form of verifying the doctoral student's teaching skills (in the case of classes conducted independently) is the assessment visit of classes conducted by the advisor or subject coordinator and student surveys.

Table 1: Determining of relations between learning outcomes in the BioMedChem Doctoral School of the University of Lodz and learning outcomes defined for particular subjects or modules of the educational process (LEARNING OUTCOMES MATRIX)

	COMPULSORY CLASSES *Classes common to doctoral students at all doctoral schools of the University of Lodz						**ELECTIVE CLASSES**													**DEVELOPMENT ACTIVITIES related to the discipline of the doctoral dissertation**	
							MODULE 1: Classes developing professional competencies, expanding knowledge and practical skills						**MODULE 2: Classes developing personal and social competencies**					**MODULE 3: Interdisciplinary activities**				
Symbol of the learning effect	Student-Master Seminar	IPB interdisciplinary progress seminar	Higher education didactics *	Apprenticeships	Science funding and knowledge transfer *	Ethical and legal aspects of scientific research*	Methods of Statistical Analysis (core course)	Methods of advanced statistical analysis	Bibliographic database management/.....	Public speaking techniques	Commercialization of research results	An introduction to effective publishing	Fundamentals of science communication	Workshops on creativity and innovation	Vocal emission	Workshops on IT tools and gamification	E-learning and blended learning techniques	Language of science (Specialised language)	Interdisciplinary classes for doctoral students	Interdisciplinary monographic lectures	Active participation in a scientific conference	Specialized training at home or abroad
BMC_W01	■	■					■	■											■	■	■	
BMC_W02	■	■					■	■	■										■	■	■	■
BMC_W03	■	■							■													
BMC_W04	■	■			■	■												■				
BMC_W05	■	■			■	■					■											
BMC_W06	■	■			■	■						■									■	
BMC_W07	■	■			■	■					■											
BMC_W08			■	■						■			■	■	■	■	■				■	
BMC_U01	■	■					■	■											■	■	■	■
BMC_U02	■	■		■		■			■			■									■	
BMC_U03	■	■			■	■					■											
BMC_U04	■	■	■	■						■		■	■								■	
BMC_U05	■	■		■						■			■								■	
BMC_U06	■	■											■					■			■	■
BMC_U07	■	■			■																	
BMC_U08	■	■		■	■																	
BMC_U09			■	■	■								■	■								
BMC_U10			■	■										■	■	■	■					
BMC_K01	■	■		■		■													■	■	■	
BMC_K02	■	■		■		■													■	■		
BMC_K03	■	■	■	■		■	■	■		■			■	■	■	■	■	■				
BMC_K04	■	■	■	■	■	■					■						■					
BMC_K05	■	■	■	■													■					■
BMC_K06	■	■	■	■		■			■			■									■	