University of Silesia in Katowice

1.	Field of study	Mathematics
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2023/2024 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

Code of the learning outcome of the programme	Learning outcomes The graduate:	Codes of the second-order PRK characteristics to which the learning outcome of the programme is related
KNOWLEDGE		
K_W01	knows and understands classical knowledge of basic branches of mathematics	2018_P7S_WG
K_W02	knows and understands the role and importance of the constructions of mathematical reasoning	2018_P7S_WG
K_W03	knows and understands the most important theorems and hypotheses from the main branches of mathematics	2018_P7S_WG
K_W04	knows and understands specialized issues from the selected field of mathematics	2018_P7S_WG
K_W05	knows and understands the latest discoveries and directions of development of selected mathematical theories	2018_P7S_WG
K_W06	knows and understands the concepts and principles of industrial property protection and copyright protection	2018_P7S_WK
OOD.2024_W01	The student has in-depth knowledge of selected scientific methods and knows problems characteristic of a particular field of science unrelated to the leading discipline of the study programme.	2018_P7S_WG, 2018_P7S_WK
SKILLS		
K_U01	can construct mathematical reasoning such as theorem proving or refuting hypotheses by constructing and selecting counter-examples	2018_P7S_UW
K_U02	can express mathematical content in speech and writing, in mathematical texts of different nature	2018_P7S_UW
K_U03	can verify the correctness of the inference in building formal evidence	2018_P7S_UW
K_U04	can carry out evidence in the selected field in which uses the tools from other branches of mathematics if necessary	2018_P7S_UW
K_U05	can - at an advanced level and including modern mathematics - apply and present in speech and writing the methods of at least one selected branch of mathematics	2018_P7S_UW
K_U06	can identify and develop their interests; in particular, is able to establish contact with specialists in their field, e.g. understand their lectures for young mathematicians	2018_P7S_UU
K_U07	can construct mathematical models used in specific applications of mathematics	2018_P7S_UW
K_U08	communicates in a foreign language using advanced language communication competences and has the ability to comprehensively read complex scientific texts and an in-depth ability to prepare various written works (including research) and oral presentations on specific issues in a given programme in a foreign language	2018_P7S_UK
K_U09	can prepare presentations on advanced mathematical issues and present them to non-specialists in these issues	2018_P7S_UK
K_U10	is aware of the importance of team effort for the success of various projects, effectively works on the team, can organize the work of the team	2018_P7S_UO
OOD.2024_U01	The student has advanced skills to set scientific questions and analyse problems or to solve problems practically on the basis of the course content, experience and skills gained in a particular field of science unrelated to the leading discipline of the study programme.	2018_P7S_UW
SOCIAL COMPETENCES		

K_K01	is ready for further self-education	2018_P7S_KR
K_K02	is ready to formulate precise questions to deepen one's understanding of the subject or to find the missing elements of reasoning	2018_P7S_KK
K_K03	is willing to appreciate the importance of intellectual honesty in one's own and others' actions and acts ethically	2018_P7S_KR
K_K04	is ready to popularise selected achievements of higher mathematics	2018_P7S_KO, 2018_P7S_KR
K_K05	is prepared to show a critical attitude towards theorems, remarks and conclusions, especially those which are not supported by a logical justification	2018_P7S_KK
K_K06	is ready to form objective opinions on issues where mathematics is the language of description	2018_P7S_KK
K_K07	is ready to entrepreneurial pursuit of the tasks undertaken	2018_P7S_KO
OOD.2024_KS01	The student has in-depth knowledge of selected scientific methods and knows problems characteristic of a particular field of science unrelated to the leading discipline of the study programme.	2018_P7S_KK

Code of the learning outcome of the programme	Learning outcomes related to becoming a qualified teacher The graduate:	Codes of the second-order PRK characteristics to which the learning outcome of the programme is related
KNOWLEDGE		
KN_Ch_W01	ma zaawansowaną wiedzę w zakresie chemii analitycznej, fizycznej, strukturalnej, biologicznej i chemii związków koordynacyjnych	2018_P7S_WG
KN_Ch_W02	posiada pogłębioną wiedzę z zakresu chemii i nauk pokrewnych i wiąże tą wiedzę z budową, właściwościami, reaktywnością pierwiastków i związków chemicznych, a także z jakościową i ilościową interpretacją zjawisk zachodzących w przyrodzie	2018_P7S_WG
KN_Ch_W03	zna chemiczne i instrumentalne metody stosowane w analizie określonych produktów chemicznych i materiałów złożonych, w tym budowę i zasadę działania aparatury pomiarowej i sprzętu chemicznego	2018_P7S_WG
KN_Ch_W04	zna właściwości, sposoby przemysłowego otrzymywania i analizy wybranych produktów chemicznych oraz zasady racjonalnego zarządzania chemikaliami zgodnie z przepisami BHP	2018_P7S_WG
KN_Ch_W05	zna metody obliczeniowe, statystyczne i narzędzia informatyczne stosowane do rozwiązywania typowych problemów z zakresu chemii i opracowywania wyników eksperymentalnych	2018_P7S_WG
KN_Ch_W06	zna zasady BHP pozwalające na samodzielną pracę na stanowisku badawczym	2018_P7S_WK
KN_NI_W01	knows and understands the organization and architecture of computers	2018_P7S_WG
KN_NI_W02	has knowledge of different operating systems	2018_P7S_WG
KN_NI_W03	understands the construction and understands the functioning principles of computer networks and network devices	2018_P7S_WG
KN_NI_W04	knows and understands the concept of algorithm and the principles of designing and analysis of algorithm and data structures	2018_P7S_WG
KN_NI_W05	has knowledge in the field of robot programming	2018_P7S_WG
KN_NI_W06	knows high-level languages and programming techniques	2018_P7S_WG
KN_NI_W07	knows and understands the principles for using e-learning platforms	2018_P7S_WG
KN_NI_W08	knows the database systems and understands their role and their functioning	2018_P7S_WG
KN_NI_W09	is familiar with the principles of designing of responsive websites and placing them in the net	2018_P7S_WG
KN_NI_W10	knows and understands the mathematical basics of information theory and cryptography and their selected practical applications	2018_P7S_WG
KN_NI_W11	has an in-depth knowledge of legal and ethical issues related to IT	2018_P7S_WK
KN_NI_W12	knows the principles of health and safety when using computer equipment	2018_P7S_WK
KN.2023_W01	knows and understands the rudiments of the philosophy of education and pedagogical axiology, the peculiarities of the main educational environments and the processes taking place in them	

KN.2023_W02	knows and understands classical and contemporary theories of human development, upbringing, learning and teaching or education as well as their application values	
KN.2023_W03	knows and understands the role of the teacher or tutor in modeling the students' attitudes and behavior	
KN.2023_W04	knows and understands standards, procedures and good practices used in pedagogical activities (pre-school education, teaching in primary and secondary schools, in technical and vocational schools, in special needs schools and in special needs and inclusive facilities, in various types of educational centres and lifelong learning centres	
KN.2023_W05	knows and understands the issue of inclusive education as well as ways of implementing the principle of inclusion	
KN.2023_W06	knows and understands the diversity of students' educational needs and the resulting school's obligations to adapt the way the education and upbringing process is organized	
KN.2023_W07	knows and understands methods of designing and conducting diagnostic activities in pedagogical practice	
KN.2023_W08	knows and understands the structure and functions of the education system – objectives, legal basis, organization and functioning of different kinds of educational and child care institutions, as well as alternative forms of education	
KN.2023_W09	knows and understands the legal basis of the education system necessary for the proper implementation of educational activities	
KN.2023_W10	knows and understands the rights of the child and the person with disabilities	
KN.2023_W11	knows and understands the principles of occupational health and safety in educational, upbringing and care institutions and the legal responsibility of the teacher in this/her respect, as well as the principles of first aid	
KN.2023_W12	knows and understands interpersonal and social communication processes, the normal course they can take as well as the ways they can be disrupted	
KN.2023_W13	knows and understands the speech apparatus, its functions and pathologies, the principles of voice emission, the visual and the vestibular systems	
KN.2023_W14	knows and understands learning content and typical learning difficulties it poses for students	
KN.2023_W15	knows and understands teaching methods and the selection of effective teaching aids, including Internet resources which support teaching a subject or conducting classes, taking into account the diverse educational needs of the students	
SKILLS		
KN_Ch_U01	potrafi interpretować i rozwiązywać problemy z zakresu chemii i nauk pokrewnych oraz potrafi wytłumaczyć określone problemy z dziedziny biologii, ochrony środowiska i farmacji	2018_P7S_UW
KN_Ch_U02	potrafi zastosować metody matematyczne, statystyczne, oraz typowe oprogramowanie użytkowe do rozwiązywania problemów z zakresu chemii a także oceny wiarygodności danych eksperymentalnych i wizualizacji wyników	2018_P7S_UW
KN_Ch_U03	potrafi określić strukturę, reaktywność, typ oddziaływań molekularnych i właściwości związków chemicznych oraz interpretować uzyskane technikami instrumentalnymi dane eksperymentalne	2018_P7S_UW
KN_Ch_U04	potrafi zsyntetyzować różnego rodzaju związki nieorganiczne i koordynacyjne, przeprowadzić pomiary fizykochemiczne, określić skład jakościowy i ilościowy prostych związków chemicznych stosując klasyczne i instrumentalne techniki pomiarowe	2018_P7S_UW
KN_Ch_U05	potrafi przygotować prace pisemne (sprawozdania, raporty, opracowania) i prezentacje ustne dotyczące zagadnień z dziedziny chemii	2018_P7S_UK
KN_Ch_U06	jest odpowiedzialny za pracę indywidualną i zespołową planując ją w sposób racjonalny i zgodny z zasadami zrównoważonego rozwoju z przepisami BHP i zasadami dobrej praktyki laboratoryjnej	2018_P7S_UO
KN_Ch_U07	realizuje ideę samokształcenia służącego pogłębianiu zdobytej wiedzy, niezbędnej do rozwiązywania problemów praktycznych i poznawczych	2018_P7S_UU
KN_NI_U01	can administer computers with different operating systems, counter threats that could destroy the results of computer work and perform the basic system diagnostics	2018_P7S_UW
KN_NI_U02	can administer a simple, local computer network providing security	2018_P7S_UW
KN_NI_U03	can use virtual environments (cloud, hardware emulators)	2018_P7S_UW
KN_NI_U04	can write a program in the selected programming language	2018_P7S_UW
KN_NI_U05	can write a program in a selected high-level programming language	2018_P7S_UW

KN_NI_U06	can write a program for a built robot	2018_P7S_UW
KN_NI_U07	can manage an e-learning course	2018_P7S_UW
KN_NI_U08	can design websites using modern technologies	2018_P7S_UW
KN_NI_U09	can design and manage databases	2018_P7S_UW
KN_NI_U10	can administer a computer network, configure network devices and solve network-related problems	2018_P7S_UW
KN_NI_U11	can cooperate in a group and organize the group's work during the implementation of joint IT projects	2018_P7S_UO
KN_NI_U12	applies the principles of health and safety at work in a computer laboratory	2018_P7S_UW
KN.2023_U01	is able to observe pedagogical situations and events, to analyze them using pedagogical and psychological knowledge and to propose solutions to problems	
KN.2023_U02	is able to adequately select, create and adapt materials and means to the diverse needs of the students, including in the field of information and communication technology, as well as methods for independent design and effective implementation of pedagogical, didactic, educational and child care activities	
KN.2023_U03	is able to recognize the needs, abilities and talents of students and to design and conduct activities promoting the integral development of students, their activity and participation in the process of education and upbringing, and in social life	
KN.2023_U04	is able to design and implement curricula taking into account the diverse educational needs of the students	
KN.2023_U05	is able to design and implement educational-preventive programs concerning the content and educational as well as preventive activities directed at students, their parents or guardians and teachers	
KN.2023_U06	is able to create training situations motivating students to study and to work on themselves, to analyze their effectiveness and modify activities so as to achieve the desired educational effects	
KN.2023_U07	is able to undertake work with students that stimulates their interests and develops their talents, to properly select teaching content, tasks and forms of work as part of self-education, also to promote students' achievements	
KN.2023_U08	is able to develop in students creativity and the ability of independent, critical thinking	
KN.2023_U09	is able to effectively stimulate and monitor students' teamwork involving educational projects	
KN.2023_U10	is able to use the process of assessment and feedback in order to stimulate students in their work on their own development	
KN.2023_U11	is able to monitor students' progress, their activity and participation in the social life of the school	
KN.2023_U12	is able to work with children with special educational needs, including children with adaptation difficulties related to their migration experience, who come from culturally diverse backgrounds or with limited knowledge of the Polish language	
KN.2023_U13	is able to responsibly organize the students' school and extracurricular work, respecting his/her right to rest	
KN.2023_U14	is able to effectively implement activities supporting students in making informed and responsible educational and professional decisions	
KN.2023_U15	is able to use the Polish language correctly; to use subject-related terminology correctly and adequately to the age of the students	
KN.2023_U16	is able to use the speech apparatus in accordance with the principles of voice emission	
KN.2023_U17	is able to provide first aid	
KN.2023_U18	is able to develop knowledge and pedagogical skills on one's own, using various sources, including sources in foreign languages, as well as technology	
SOCIAL COMPETENCES		
KN_Ch_K01	krytycznie ocenia zasób posiadanej wiedzy, rozumie potrzebę interdyscyplinarnego podejścia do rozwiązywanych problemów z uwzględnieniem opinii ekspertów w przypadku trudności w samodzielnym ich rozwiązaniu	2018_P7S_KK
KN_Ch_K02	rozumie i przestrzega zasad etyki zawodowej i własności intelektualnej	2018_P7S_KR
KN_NI_K01	understands the need to comply with ethical and legal principles related to activity in the IT environment (e.g. the use of copyrights and licenses)	2018_P7S_KR
KN_NI_K02	uses e-learning opportunities to work in a group	2018_P7S_UO

KN.2023_KS01	is ready to use universal principles and ethical standards in professional activity, guided by respect for every human being	
KN.2023_KS02	is ready to build a relation based on mutual trust between all participants of the upbringing and education process, including the student's parents or guardians, and involving them in activities conducive to educational effectiveness	
KN.2023_KS03	is ready to communicate with people from different backgrounds, exhibiting diverse emotional states, resolving conflicts through dialogue, creating an atmosphere conducive to communication in and outside the classroom	
KN.2023_KS04	is ready to make decisions related to the way the educational process is organized in inclusive education	
KN.2023_KS05	is ready to recognize the peculiarity of the local community and to engage in cooperation for the benefit of the students and the community	
KN.2023_KS06	is ready to design activities supporting the developing of the school or the educational institution and stimulating the improvement of the quality of work of these institutions	
KN.2023_KS07	is ready to work in a team, performing various roles in it and cooperating with teachers, tutors, specialists, students' parents or guardians as well as other members of the school and local community	