

1.	Field of study	Mathematics
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2019/2020 (winter term)
4.	Level of qualifications/degree	first-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	understands the civilisational importance of mathematics and its applications	2018_P6S_WG, 2018_P6S_WK
K_W02	understands well the theory and the meaning of proof in mathematics, and the concept of materiality of assumptions.	2018_P6S_WG
K_W03	understands the construction of mathematical theories, can use mathematical formalism to build and analyse simple mathematical models in other fields of science	2018_P6S_WG
K_W04	knows the basic concepts and theorems from the studied branches of mathematics	2018_P6S_WG
K_W05	knows the basic examples, both illustrating concrete mathematical concepts and allowing to disprove erroneous hypotheses or misguided reasoning	2018_P6S_WG
K_W06	knows selected concepts and methods of mathematical logic, plurality theory, and discrete mathematics included in the foundations of other mathematical disciplines	2018_P6S_WG
K_W07	knows the basics of differential calculus and the integral calculus of one and more variable functions as well as other branches of mathematics used in it	2018_P6S_WG
K_W08	knows the basics of computational and programming techniques supporting the work of mathematicians and understands their limitations	2018_P6S_WG
K_W09	knows at a basic level at least one software package for symbolic calculations	2018_P6S_WG
K_W10	speaks at least one foreign language at the intermediate level (B2)	2018_P6S_UK
K_W11	knows the basic principles of occupational health and safety	2018_P6S_WK
K_W12	knows and understands legal, economic and ethical aspects of mathematics	2018_P6S_WK
K_W13	knows and understands basic concepts and principles of industrial property and copyright protection	2018_P6S_WK
K_W14	has a basic knowledge of management, including quality management and business operation	2018_P6S_WK
K_W15	has a general knowledge of selected scientific methods and is familiar with the issues characteristic of a scientific discipline not related to the programme	2018_P6S_KK, 2018_P6S_KO
SKILLS		
K_U01	is able to clearly express in speech and writing correct mathematical reasoning, formulate theorems and definitions	2018_P6S_UW
K_U02	uses the propositional calculus and predicate calculus; can use quantifiers correctly also in non-formal language	2018_P6S_UK
K_U03	is able to conduct simple and moderately difficult proof by means of full induction; can define recursive functions and relationships	2018_P6S_UW
K_U04	is able to apply a system of classical logic to the formalisation of mathematical theories	2018_P6S_UW
K_U05	can create new objects by constructing quotient spaces or Cartesian products	2018_P6S_UW

K_U06	uses the language of plurality theory, interpreting issues from different areas of mathematics	2018_P6S_UW
K_U07	understands issues related to different types of infinity and orders in sets	2018_P6S_UW
K_U08	knows the concept of real and complex numbers; knows the examples of real irrational and transcendental numbers	2018_P6S_UW
K_U09	is able to define functions, including the use of border crossings, and to describe their properties	2018_P6S_UW
K_U10	uses the notions of convergence and limit in various contexts; can at a basic and medium level of difficulty calculate the limits of sequences and functions and study the absolute and conditional convergence of series.	2018_P6S_UW
K_U11	is able to interpret and explain functional relationships presented in the form of formulas, tables, charts, diagrams and apply them to practical issues	2018_P6S_UW
K_U12	is able to use theorems and methods of differential calculus of one and more variable function related to optimization, searching for local and global extremes and examining the course of the function, giving precise and accurate reasoning.	2018_P6S_UW
K_U13	uses the definition of the integral of one and more real variable function; can explain the analytical and geometric sense of the concept	2018_P6S_UW
K_U14	is able to integrate one and more variable functions by part and by substitution; is able to change the order of integration; is able to express smooth surface areas and volumes as appropriate integrals	2018_P6S_UW
K_U15	is able to use tools and numerical methods to solve selected issues of differential and integral calculi; including those based on its application	2018_P6S_UW
K_U16	uses the concept of linear space, vector, linear transformation and matrix	2018_P6S_UW
K_U17	perceives the presence of algebraic structures (group, ring, body, linear space) in various mathematical issues, not necessarily related directly to mathematics	2018_P6S_UW
K_U18	can calculate determinants and knows their properties; can give a geometric interpretation of a determinant and understand its relation to mathematical analysis	2018_P6S_UW
K_U19	solves sets of linear equations with constant coefficients; can use geometric interpretation of solutions	2018_P6S_UW
K_U20	finds matrices of linear transformation in different bases; calculates eigenvalues and eigenvectors of matrices; can explain the geometric sense of these concepts	2018_P6S_UW
K_U21	is able to solve simple ordinary differential equations: homogeneous, with separated variables, with complete differential form, linear, and linear systems of equations	2018_P6S_UW
K_U22	is able to apply the theorem on the existence of solutions to specific types of differential equations	2018_P6S_UW
K_U23	recognizes and determines the most important topological properties of subsets of the Euclidean and metric spaces	2018_P6S_UW
K_U24	is able to use topological properties of sets and functions to solve qualitative tasks	2018_P6S_UW
K_U25	identifies problems, including practical issues that can be solved algorithmically; can make specifications for such a problem	2018_P6S_UW
K_U26	is able to construct and analyse an algorithm in accordance with the specification and write it in the selected programming language	2018_P6S_UW
K_U27	can compile, start and test a self-written computer programme	2018_P6S_UW
K_U28	is able to use computer programmes for data analysis	2018_P6S_UW
K_U29	can model and solve discrete problems	2018_P6S_UW
K_U30	uses the concept of probabilistic space; can build and analyse a mathematical model of a random experiment	2018_P6S_UW
K_U31	can give various examples of discrete and continuous probability distributions and discuss selected random experiments and mathematical models in which these distributions occur; knows the practical application of basic distributions	2018_P6S_UW
K_U32	is able to apply the formula for total probability and the Bayes formula	2018_P6S_UW
K_U33	can determine the parameters of a random variable distribution with a discrete and continuous distribution; can use limit theorems and laws of great numbers to estimate probabilities	2018_P6S_UW
K_U34	is able to use statistical characteristics of the population and the sample equivalents	2018_P6S_UW
K_U35	can make simple statistical inferences, including computer tools	2018_P6S_UW
K_U36	can talk about mathematical issues in a clear and non-formal language	2018_P6S_UK

K_U37	is able to present mathematical issues in writing and in a clear language	2018_P6S_UK
K_U38	can practically apply mathematical knowledge	2018_P6S_UK
K_U39	can edit mathematical texts using the LaTeX package	2018_P6S_UW
K_U40	has the ability to establish and analyse problems on the basis of the acquired content of a scientific discipline unrelated to the programme	2018_P6S_KK, 2018_P6S_KO
K_U41	has the ability to understand and create various types of written and oral texts requiring systemic knowledge of the language in relation to its grammatical structures, lexis and phonetics; communicates in a foreign language using different communication channels and techniques to the extent appropriate for the specific area of knowledge.	2018_P6S_UK

SOCIAL COMPETENCES

K_K01	knows the limitations of their own knowledge and understands the need for further education	2018_P6S_KK, 2018_P6S_UU
K_K02	is able to precisely formulate questions in order to deepen their understanding of a given topic or to find missing elements of reasoning	2018_P6S_KK, 2018_P6S_UK
K_K03	is able to work as a team; understands the need to work systematically on all projects that are long-term	2018_P6S_KK, 2018_P6S_UO
K_K04	understands and appreciates the importance of intellectual honesty in the actions of one's own and others; acts ethically	2018_P6S_KR
K_K05	understands the need for popular presentation of selected achievements of higher mathematics to laymen	2018_P6S_KO, 2018_P6S_UK
K_K06	can independently search for information in literature and online resources, including foreign languages	2018_P6S_KK, 2018_P6S_UK
K_K07	can formulate opinions on basic mathematical issues	2018_P6S_KK
K_K08	is able to discuss subject-matter related to higher mathematics with an interlocutor who has a different opinion	2018_P6S_UK
K_K09	can think in terms of entrepreneurship, act in an entrepreneurial way and understands the economic aspects of this activity	2018_P6S_KO
K_K10	understands the need for an interdisciplinary approach to solving problems, integrating knowledge from different disciplines and practising self-education to deepen the knowledge acquired	2018_P6S_KK, 2018_P6S_KO

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_W01	has a basic knowledge of human philosophy, philosophy of education and pedagogical axiology; can relate it to the personal and integral development of the student	2018_P6S_WG, 2018_P6S_WK
KN_W02	has a basic knowledge of interpersonal and social communication processes, as well as their regularity and disruption	2018_P6S_WG, 2018_P6S_WK
KN_W03	has a basic knowledge of classical and contemporary theories concerning human development, education, learning and teaching, and the various conditions of these processes; can critically evaluate them and use them creatively	2018_P6S_KK, 2018_P6S_WG, 2018_P6S_WK
KN_W04	has a basic knowledge of the main educational environments, their specificities and the processes occurring inside them	2018_P6S_WG, 2018_P6S_WK
KN_W05	has a basic knowledge of the role of teacher-educator in shaping students' attitudes and behaviours	2018_P6S_WG, 2018_P6S_WK

KN_W06	has a basic understanding of the specificities of the functioning of students with diverse educational needs, including particularly gifted students	2018_P6S_WG, 2018_P6S_WK
KN_W07	has a basic knowledge of inclusive education, as well as how to implement the principle of inclusion	2018_P6S_WG, 2018_P6S_WK
KN_W08	has a basic knowledge of designing and conducting diagnostic tests in pedagogical practice, extended to the relevant educational stages and considering the diverse educational needs of students	2018_P6S_WG, 2018_P6S_WK
KN_W09	has a basic knowledge of the structure and functions of the education system – objectives, legal bases, organisation and functioning of educational, teaching and care institutions	2018_P6S_WG, 2018_P6S_WK
KN_W10	has a basic knowledge of alternative forms of education	2018_P6S_WG
KN_W11	has a basic knowledge of the methodology for the task performance – standards, procedures and good practices applied at a given stage and area of pedagogical activity (pre-school education, teaching in general schools, technical and vocational schools, continuing education, at schools and special and integration classes, in various types of educational centres)	2018_P6S_WG, 2018_P6S_WK
KN_W12	has a basic knowledge of health and safety at work in educational, teaching and care institutions, of first aid and legal liability of the teacher	2018_P6S_WG, 2018_P6S_WK
KN_W13	has a rudimentary knowledge of the basics of education law, which is necessary for the proper implementation of conducted educational activities	2018_P6S_WG, 2018_P6S_WK
KN_W14	has a basic knowledge of the rights of the child	2018_P6S_WG, 2018_P6S_WK
KN_W15	has a rudimentary knowledge of the basics of the functioning and pathology of the speech apparatus	2018_P6S_WG, 2018_P6S_WK
NI_W01	knows and understands the organization and architecture of computers	2018_P6S_WG
NI_W02	has knowledge of different operating systems	2018_P6S_WG
NI_W03	knows and understands the concept of algorithm and the principles of designing and analysis of algorithm and data structures	2018_P6S_WG
NI_W04	has knowledge in the field of robot programming	2018_P6S_WG
NI_W05	has knowledge in the field of computer graphics and multimedia	2018_P6S_WG
NI_W06	has basic knowledge of information technology, word processing, research, web development	2018_P6S_WG
NI_W07	has structured knowledge in the field of obtaining, processing and organizing information	2018_P6S_WG
NI_W08	knows the basic positional number systems	2018_P6S_WG
NI_W09	has a basic knowledge of legal and ethical issues related to IT	2018_P6S_WK
NI_W10	knows the basic principles of health and safety when using computer equipment	2018_P6S_WK
SKILLS		
KN_TIK01	uses a basic knowledge and skills in terms of IT techniques, composing graphic illustrations, working on text, performing calculations in a spreadsheet, obtaining data and information from databases, using services in computer networks, obtaining, collecting and processing information	2018_P6S_UW
KN_TIK02	applies and develops their own ICT education and assessment methods in the field of the subject taught	2018_P6S_UW
KN_U01	can observe pedagogical situations and events, can analyse them using pedagogical and psychological knowledge and propose solutions to problems	2018_P6S_UW
KN_U02	can adequately select, create and adapt materials and resources to the diverse needs of students, including those related to information and communication technology, and working methods to design and effectively conduct pedagogical, teaching, educational and care activities on their own	2018_P6S_UW
KN_U03	can recognize students' needs, opportunities and abilities and design and conduct activities that support the integral development of students, their activity and participation in the teaching and educational processes and in social life	2018_P6S_UW

KN_U04	can design and implement curricula taking into account the diverse educational needs of students	2018_P6S_KK, 2018_P6S_UW
KN_U05	can design and implement educational and preventive programs in the field of educational and preventive content and activities aimed at students, their parents or guardians and teachers	2018_P6S_UW
KN_U06	can create educational and teaching situations that motivate students to learn and work on themselves, analyse their effectiveness and modify actions in order to achieve the desired teaching and educational outcomes	2018_P6S_KK, 2018_P6S_UK, 2018_P6S_UO, 2018_P6S_UW
KN_U07	can work with students to arouse their interests and develop their talents, properly select the teaching content, tasks and forms of work within self-education, and promote students' achievements	2018_P6S_UK, 2018_P6S_UO, 2018_P6S_UW
KN_U08	can develop creativity and the ability to think independently and critically in students	2018_P6S_UK, 2018_P6S_UW
KN_U09	can effectively animate and monitor the implementation of team educational activities of students	2018_P6S_UK, 2018_P6S_UW
KN_U10	can use the assessment and feedback processes to stimulate students in their work on their own development	2018_P6S_UK, 2018_P6S_UW
KN_U11	can monitor students' progress, activity and participation in the school social life	2018_P6S_KR, 2018_P6S_UO, 2018_P6S_UW
KN_U12	can work with children with special educational needs, including children with adaptive difficulties related to migration who come from culturally diverse backgrounds or with limited knowledge of Polish	2018_P6S_UW
KN_U13	can responsibly organise the students' school and extra-school work, respecting their right to rest	2018_P6S_UW
KN_U14	can effectively implement supportive actions for students in conscious and responsible educational and professional decision-making	2018_P6S_UW
NI_U01	can administer computers with Windows operating systems, counter threats that could destroy the effects of computer work and can perform the basic system diagnostics, and administer a simple local computer network, providing security	2018_P6S_UW
NI_U02	can use virtual environments (cloud)	2018_P6S_UW
NI_U03	can independently design algorithms that perform selected tasks, can perform an analysis of the complexity of a given algorithm	2018_P6S_UW
NI_U04	can write a program in the selected programming language	2018_P6S_UW
NI_U05	can write a program for a built robot	2018_P6S_UW
NI_U06	can create and modify graphic objects and multimedia files using selected graphics and multimedia programs	2018_P6S_UW
NI_U07	can prepare an extensive multimedia presentation in the selected program for creating presentations	2018_P6S_UW
NI_U08	can process and organize data using the selected Office programs	2018_P6S_UW
NI_U09	can solve problems using basic applications	2018_P6S_UW
NI_U10	can create a simple website and put it in the network	2018_P6S_UW
NI_U11	can cooperate in a group and organize the group's work during the implementation of joint IT projects	2018_P6S_UO
NI_U12	applies the principles of health and safety at work in a computer laboratory	2018_P6S_UW
SOCIAL COMPETENCES		
KN_K01	uses universal principles and ethical norms in their activities, guided primarily by respect for each person	2018_P6S_KR
KN_K02	has interpersonal competences enabling the building of a relationship of mutual trust between all subjects in the learning process, including parents (guardians) of a student, involving them in activities conducive to the effectiveness of teaching	2018_P6S_KO

KN_K03	has developed communication skills, can communicate with people from different backgrounds who are in different emotional states; can resolve conflicts in dialogue and create a good atmosphere for communication in the classroom and beyond	2018_P6S_KK
KN_K04	speaks correctly their mother tongue, showing concern for the culture and ethics of their own expression and of students' expression	2018_P6S_KR
KN_K05	can recognise the specificities of the local environment and undertake cooperation for the benefit of students and the environment	2018_P6S_KK, 2018_P6S_KO
KN_K06	can stimulate improvements in the quality of school work (educational institution) through their work and the influence on others	2018_P6S_KO
KN_K07	effectively animates and monitors the implementation of the team activities of students	2018_P6S_UO
KN_K08	can work on a team fulfilling different roles; has the ability to work with other teachers, educators and parents of students, and other people who form the school and local community	2018_P6S_UO
KN_R01	self-development: consciously defines their attitude towards the fundamental objectives of education, as well as the various aspects of teaching philosophy	2018_P6S_UU
KN_R02	self-development: projects a path of their own development, including self-vocational training, self-development, as well as the prevention of burnout	2018_P6S_UU
KN_R03	own development: analyses and evaluates their own teaching, educational and care activities, identifies areas for modification, systematically improving their own work	2018_P6S_UU
KN_R04	self-development: designs and implements innovative activities	2018_P6S_UU
KN_R05	self-development: continuously improves, develops and enriches their own skills in the use of information and communication technologies in teaching	2018_P6S_UU
KN_TIK03	inspires and engages students in learning, creativity and the development of computational thinking	2018_P6S_KR
KN_TIK04	promotes and shapes students' citizenship and responsibility in the digital media world	2018_P6S_KO
KN_TIK05	uses ICT environments in their own professional development	2018_P6S_UU
NI_K01	understands the need to comply with ethical and legal principles related to activity in the IT environment (including the use of copyrights, licenses)	2018_P6S_KR
NI_K02	understands the need for continuous training and self-education	2018_P6S_KK, 2018_P6S_UU