

Learning outcomes of the programme:

1.	Field of study	Mathematics
2.	Academic year of entry	2018/2019 (winter term)
3.	Level of qualifications/degree	second-cycle studies
4.	Degree profile	general academic

Code of the learning outcome of the programme	Learning outcomes The graduate:	Codes of the learning outcomes of the areas of education to which the learning outcome of the programme is related
KNOWLEDGE		
K_W01	has extensive knowledge of basic mathematical disciplines	X2A_W01
K_W02	understands well the role and significance of mathematical reasoning constructions	X2A_W01, X2A_W03
K_W03	knows the most important theorems and hypotheses of basic mathematical disciplines	X2A_W01, X2A_W06
K_W04	has extensive knowledge of selected theoretical or applied mathematical discipline	X2A_W02
K_W05	has extensive knowledge of selected mathematical discipline: 1) knows the majority of classical definitions and theorems as well as their proofs	X2A_W02
K_W06	2) is able to understand the formulation of issues at the research stage	X2A_W02, X2A_W06
K_W07	3) knows the relations of a selected discipline with other theoretical and applied mathematical disciplines	X2A_W02
K_W08	knows the advanced calculation techniques useful for mathematicians and understands their limitations	X2A_W02, X2A_W04
K_W09	knows the basics of stochastic modeling in economic sciences or natural sciences	X2A_W03, X2A_W04
K_W10	knows the numerical methods applied to find the approximate solutions for selected mathematical problems found in applied sciences	X2A_W03, X2A_W04
K_W11	knows the mathematical basics of information theory, the theory of algorithm, cryptography and their selected applications in practice	X2A_W03, X2A_W04
K_W12	knows well at least one software package used for symbolic calculations and one package for statistical processing of data	X2A_W04, X2A_W05
K_W13	knows the English language leastwise at an intermediate (B2+) level	X2A_U10, X2A_W06
K_W14	knows health and safety principles to a degree sufficient for conducting independent work as a mathematician	X2A_W07
K_W15	knows and understands the legal, economic and ethical aspects of the work of mathematicians	X2A_W08
K_W16	knows and understands the basic notions and principles of industrial property protection and copyright law	X2A_W09
K_W17	has basic knowledge with regard to management, including managing quality and running business activity	X2A_W10
K_W18	has an in-depth knowledge regarding selected scientific methods and knows the issues characteristic for the scientific discipline not related to the programme	
SKILLS		
K_U01	is able to relate to mathematical reasoning, proving theorems and refuting hypotheses through constructing and selection of counterexamples	X2A_U01, X2A_U02, X2A_U05
K_U02	is able to express mathematical data in speech and writing and in various mathematical texts	X2A_U03, X2A_U05
K_U03	is able to verify the correctness of reasoning in constructing formal proofs	X2A_U01, X2A_U02
K_U04	is able to find the necessary information in professional literature, databases and other sources, knows selected mathematical scientific journals	X2A_U03
K_U05	applies with ease tools used for analysis, including calculus (in particular line integral and surface integral), elements of complex analysis and Fourier analysis	X2A_U01
K_U06	is acquainted with methods of solving classical ordinary and partial differential equations, is able to apply them in solving typical practical problems	X2A_U01
K_U07	knows the construction of integral and Lebesgue measure; is able to apply the notions of measure theory in solving typical theoretical and practical problem	X2A_U01
K_U08	is able to recognise topological structures in mathematical objects found in geometry or mathematical analysis; is able to apply the basic topological properties of sets, functions and transformations	X2A_U01
K_U09	employs the language and methods of functional analysis in solving problems of mathematical analysis and applies them in practice, in particular applies the properties of classical Banach and Hilbert spaces	X2A_U01

K_U10	is able to apply algebraic methods in solving problems of various mathematical disciplines and practical tasks	X2A_U01
K_U11	knows basic probability distributions and their properties; is able to apply them in solving practical problems	X2A_U01
K_U12	is acquainted with basics of statistics (estimation and hypothesis testing) and with basics of statistical processing of data	X2A_U01
K_U13	knows, at an advanced level encompassing contemporary mathematics, applies and presents in speech and writing, methods of at least one selected branch of mathematics, mathematical analysis and functional analysis; theory of differential equations and dynamic sets, algebra, number theory, geometry and topology, theory of probability and statistics, discrete mathematics and graph theory, logic and theory of plurality	X2A_U01, X2A_U02, X2A_U05
K_U14	is able to conduct a proof whereby, if need be, tools of other mathematical disciplines may be used	X2A_U01, X2A_U02
K_U15	is able to determine their interests and pursue them; in particular is able to build relations with other specialists, e.g. understands their lectures intended for young mathematicians	X2A_U06, X2A_U08, X2A_U09
K_U16	is able to construct mathematical models applied in specific cases in mathematics	X2A_U02, X2A_U04, X2A_U06
K_U17	recognises mathematical structures in selected theories of natural sciences	X2A_U02, X2A_U04, X2A_U06
K_U18	is able to apply stochastic processes as a tool for modeling the phenomena and analyses their evolution	X2A_U02, X2A_U04, X2A_U06
K_U19	understands mathematical basics of algorithm analysis and calculation processes	X2A_U02, X2A_U04, X2A_U06
K_U20	is able to construct algorithms of correct numerical properties used for solving mathematical problems	X2A_U02, X2A_U04, X2A_U06
K_U21	is able to edit mathematical texts with the aid of LaTeX package	X2A_U08, X2A_W05
K_U22	has an in-depth skill of identifying and analyzing problems on the basis of the data obtained from the discipline not related to the programme	
SOCIAL COMPETENCES		
K_K01	knows the limitations of their knowledge and understands the need for further education	X2A_K01, X2A_U07
K_K02	is able to precisely formulate questions whose aim is to deepen the comprehension of a given issue or to identify the missing elements	X2A_K01, X2A_K02, X2A_U09
K_K03	is able to work in team, understands the necessity of systematic work over all long-term projects	X2A_K02, X2A_K03, X2A_K05, X2A_K06
K_K04	understands and appreciates the role of intellectual integrity in their actions and the actions of others; acts ethically	X2A_K03, X2A_K04
K_K05	understands the need of presenting the achievements of higher mathematics in a popular scientific manner	X2A_K05, X2A_K06
K_K06	is able to independently search for the data in professional literature and online; including foreign language sources	X2A_K01
K_K07	is able to form opinions on basic mathematical issues	X2A_K06
K_K08	is able to think and act in entrepreneurial categories and understands the economic aspects of such actions	X2A_K07
K_K09	understands the need of an interdisciplinary approach towards the problems solved, of integrating knowledge of different disciplines and of practicing self-education in order to deepen the knowledge gained	

Code of the learning outcome of the programme	Learning outcomes related to becoming a qualified teacher The graduate:	Codes of the learning outcomes of the areas of education to which the learning outcome of the programme is related
KNOWLEDGE		
KN_W01	knows the advanced terminology used to describe pedagogical (educational) phenomena	H2A_W02, S2A_W02
KN_W02	has extended knowledge of human development in the life cycle, both biologically and psychologically and socially, extended in relation to selected educational stages	H2A_W03
KN_W03	has extended knowledge of interpersonal and social communication processes, their regularity and disruption; relates this knowledge to educational activity (educational, caring and teaching)	H2A_W05, H2A_W06, S2A_W04
KN_W04	has extended knowledge of education and training, their philosophical, socio-cultural, biological, psychological and medical bases	H2A_W07, S2A_W05
KN_W05	knows the majority of theories about upbringing, learning and teaching; understand various conditions of these these processes	S2A_W06

KN_W06	has extended knowledge of the main educational environments, their specificity and the processes occurring within them	S2A_W07, S2A_W08
KN_W07	has extended knowledge of designing and conducting diagnostic tests in pedagogical practice, extended in relation to selected educational stages and considering special educational needs of students with developmental disorders	S2A_W04, S2A_W05, S2A_W06
KN_W08	has extended knowledge of the structure and functions of education system: goals, legal bases, organization and functioning of educational and care providing facilities/institutions	S2A_W08, S2A_W09
KN_W09	has a detailed knowledge of the methodology of performing typical tasks – standards, procedures and good practices applied in the selected area of pedagogical activity (pre-school education, teaching in mainstream school, special schools and in integrated departments)	H2A_W07, S2A_W07
KN_W10	has a detailed knowledge of the methodology of performing typical tasks – standards, procedures and good practices applied in the selected area of pedagogical activity (pre-school education, teaching in mainstream school, special schools and in integrated departments)	S2A_W08
KN_W11	has extended knowledge of how to design a path for personal development and professional advancement	H2A_W05, H2A_W06, S2A_W07, S2A_W08, S2A_W09
KN_W12	has extended knowledge of the ethics of the teaching profession	S2A_W07, S2A_W08, S2A_W09
KN_W13	has extended knowledge of speech organ functioning and its pathology	H2A_W04
SKILLS		
KN_U01	is able to observe, analyse and interpret situations and pedagogical events	H2A_U01, S2A_U01
KN_U02	is able to apply the extended theoretical knowledge of pedagogy in order to analyse and interpret a specific type of educational and caring situations and events as well as motives and behavior patterns of the participants of these situations	H2A_U02, S2A_U02
KN_U03	is able to use the extended theoretical knowledge of pedagogy, psychology and teaching and detailed methodology in order to diagnose, analyse and predict teaching situations and select strategies for implementing practical actions at specific educational stages	H2A_U04, S2A_U03, S2A_U04, S2A_U05, S2A_U06
KN_U04	is able to independently acquire knowledge and develop their professional skills related to pedagogical (educational, care and teaching) activities using various sources (both mother tongue and foreign languages) and modern technologies	H2A_U03, H2A_U07, H2A_U08, H2A_U09, S2A_U06
KN_U05	has extended diagnostic skills to recognise the situations of students with special educational needs, develop the results of observations and form conclusions	S2A_U07, S2A_U08
KN_U06	has fully developed interpersonal communication skill; is able to use specialist language and communicate clearly and coherently with people from different backgrounds	H2A_U07, H2A_U08, H2A_U09, S2A_U09, S2A_U10, S2A_U11
KN_U07	is able to assess the usefulness of any methods, procedures and good practices for the implementation of educational, caring and teaching tasks related to selected educational stages	H2A_U01, H2A_U04, S2A_U01, S2A_U02
KN_U08	is fully able to select and use available materials, means and working methods in order to design and effectively implement pedagogical (educational, caring and teaching) activities; uses modern technologies (ICT) in the teaching work	S2A_U02, S2A_U03, S2A_U05, S2A_U06
KN_U09	is able to manage skillfully educational and upbringing processes	S2A_U06, S2A_U07, S2A_U08
KN_U10	is able to animate works on the development of participants of pedagogical processes and support their independence in gaining knowledge as well as inspire them to work for lifelong learning	S2A_U06, S2A_U07
KN_U11	KN_U11 is fully able to work in a team with different roles; is able to undertake and assign tasks; has basic organisational skills which enable them to carry out pedagogical (educational, caring and teaching) activities	S2A_U06, S2A_U07
KN_U12	KN_U12 is able to skillfully analyse their own pedagogical (educational, caring and teaching) activities and indicate possible areas for modification in a future action	S2A_U08
KN_U13	is able to design a plan for their own professional development	H2A_U05, S2A_U03, S2A_U04, S2A_U05
KN_U14	has developed proper habits for using the speech organ	T2A_U03, T2A_U04
SOCIAL COMPETENCES		
KN_K01	is aware of the level of knowledge and skills; understands the necessity for continuous professional and personal development; self-assesses their own competences and improves skills used in practice	H2A_K01, S2A_K01
KN_K02	is convinced of the sense, value and the need to undertake pedagogical actions in social environment; is ready to undertake professional challenges; is active, undertakes the challenge and is characterised by perseverance in the implementation of individual and collective professional actions resulting from the role of the teacher	H2A_K02, H2A_K03, S2A_K02, S2A_K03
KN_K03	is aware of the need for individualised pedagogical assessment in relation to students of special educational needs	H2A_K04, S2A_K04

KN_K04	is convinced of the importance of professional behavior, reflection on ethical issues and observance of principles of professional ethics; shows the characteristics of a reflective practitioner	H2A_K02, H2A_K03, H2A_K04, S2A_K02, S2A_K03, S2A_K04
KN_K05	is aware of ethical dimension of diagnosing and evaluating students	H2A_K03, H2A_K04, S2A_K03, S2A_K04
KN_K06	is able to communicate in the working environment, both with persons who are subjects of pedagogical activities as well as with persons co-participating in the teaching and educational processes and with specialists supporting these processes	H2A_K02, S2A_K02, S2A_K03, S2A_K05
KN_K07	prepares responsibly for their work, designs and carries out pedagogical activities	S2A_K05
KN_K08	is able to undertake individual and collective actions to improve the quality of school work	S2A_K06, S2A_K07