

Learning outcomes

Outcome symbol	After completing second-cycle studies in data engineering, the graduate:	Reference to PRK level 7
KNOWLEDGE		
K_W01	knows the significance of data processing and data security for contemporary science and technology, and for the development of an information society	P7S_WG-O1.2A
K_W02	knows computational methods and information techniques used to solve problems relating to data mining; is able to build appropriate mathematical models	P7S_WG-O1.1 P7S_WG-I1
K_W03	has knowledge necessary to understand and model problems of mining large data volumes	P7S_WG-O1.1 P7S_WG-I1
K_W04	has extended knowledge of data mining methods, their historical development and significance for the process of acquiring knowledge of the world and for development of humankind; has general knowledge of current progress in this field of study	P7S_WG-O1.1 P7S_WG-O1.2A
K_W05	has extended knowledge of operations research methods and decision analysis, as well as knowledge of their historical development and significance; demonstrates general knowledge of current developments in these fields of study	P7S_WG-O1.1 P7S_WG-O1.2A
K_W06	knows methods for building mathematical optimization models, as well as theoretical background of using them in practice	P7S_WG-O1.1
K_W07	has extended knowledge of computer methods of data processing; knows selected mathematical software packages, as well as computational and programming techniques which support the work of an analyst and understands their constraints	P7S_WG-O1.1 P7S_WG-I1
K_W08	knows tools for intelligent data analysis and has basic knowledge of methods of multidimensional data analysis; knows various information tools facilitating processing, data analysis and statistical inference	P7S_WG-O1.1 P7S_WG-I1
K_W09	knows basic sampling schemes for finite populations and methods of analyzing data acquired with the use of these schemes	P7S_WG-O1.1 P7S_WG-I1
K_W10	demonstrates knowledge of basic computational methods and information techniques used to present and analyze data concerning markets and shares, and facilitating decision making	P7S_WG-O1.1 P7S_WG-I1
K_W11	has knowledge concerning social aspects of information technology; is aware of ethical, legal and economic issues facing analysts, mathematicians and computer scientists, and their professions; has knowledge concerning protection of intellectual property and patent law	P7S_WK-O2.2
K_W12	is familiar with legal regulations and threats concerning data security in information systems	P7S_WK-O2.1 P7S_WG-I1
K_W13	knows general principles of creating and developing forms of individual entrepreneurship which uses knowledge of cryptology for safe data processing	P7S_WK-O2.3
K_W14	knows principles of occupational health and safety for employees working with a computer	P7S_WK-O2.2
K_W15	has achieved English language proficiency equivalent to level B2+ of European Framework of Reference for Languages and is familiar with specialist terminology from selected branches of mathematics	P7S_UK-O4.3
SKILLS		

K_U01	is able to use mathematical knowledge in order to model simple tasks specific for a data analyst	P7S_UW-O3.1 P7S_UW-O3.3A
K_U02	is able to properly formulate a problem in the language of mathematics and carry out an analysis necessary to choose most appropriate software to be used for solving the problem; is able to estimate possibilities and limitations of such approach	P7S_UW-O3.1 P7S_UW-O3.3A
K_U03	can plan and carry out an analysis of a practical problem using models and methods of operations research or methods and tools of data mining	P7S_UW-O3.1 P7S_UW-O3.3A
K_U04	is able to make a critical evaluation of received results and conduct an analysis of results sensitivity to changes of parameters and input data	P7S_UW-O3.1 P7S_UW-O3.3A
K_U05	is able to present analysis results in his own, independently prepared research report which includes the purpose of the analysis, methodology used and significance of the results obtained	P7S_UW-O3.1 P7S_UK-O4.1
K_U06	basing on data stored in data bases, is able to create reports which meet requirements concerning structure and contents	P7S_UW-O3.1 P7S_UK-O4.1
K_U07	is able to plan a sample survey based on a selected scheme, can make a critical analysis of collected data and results obtained, and use known statistical packages to conduct multidimensional data analysis	P7S_UW-O3.1 P7S_UW-O3.3A
K_U08	is able to use various tools in order to form questions and generate reports	P7S_UW-O3.1
K_U09	is able to, in a clear manner, present results of scientific and technological findings related to improving data security, and present their influence on improving security of systems and IT services	P7S_UW-O3.1 P7S_UK-O4.1
K_U10	can present issues of data mining in a clear and commonly understood language	P7S_UK-O4.1
K_U11	is able to, in a clear manner, both in oral and written form, formulate definitions and theorems, and give examples of applications of mathematical concepts taught during the course	P7S_UW-O3.1 P7S_UK-O4.1
K_U12	demonstrates the ability to prepare overviews and written papers concerning applications of mathematics to selected problems and practical issues	P7S_UW-O3.1 P7S_UK-O4.1
K_U13	is able to independently get information from literature, Internet, and other reliable sources, process and interpret it, as well as reach conclusions and formulate opinions	P7S_UW-O3.1 P7S_UK-O4.1
K_U14	is able to study on his own and have the ability to schedule tasks needed to achieve research objectives	P7S_UU-O6
K_U15	has achieved English language proficiency in the language of mathematics equivalent to level B2+ of European Framework of Reference for Languages	P7S_UK-O4.3
SOCIAL COMPETENCES		
K_K01	understands the need for extending his knowledge and practical skills by reading scientific journals and popular science magazines	P7S_KK-O7.1 P7S_KK-O7.2
K_K02	takes active part in dialogues in order to clarify and deepen his understanding of the topic under discussion; can cooperate and work in a team, taking on different roles	P7S_UK-O4.2 P7S_UO-O5.1 P7S_UO-O5.2
K_K03	is able to set priorities in order to accomplish a task set by themselves or by others; is able to think and act in enterprising ways	P7S_KO-O8.2 P7S_KO-O8.3
K_K04	understands and appreciates the significance of intellectual honesty, both in his own and in other people's activities; recognizes ethical, legal and social aspects of computerization, respect and follow these principles in his professional activities	P7S_KR-O9
K_K05	is aware of responsibility for making research decisions; understands social aspects of practical application of acquired knowledge and skills and aware of responsibilities related to these activities	P7S_KR-O9

