App. no. 1 to Education Programme

EFFECTS OF EDUCATION ON THE MAJOR

Department of Computer Science and Management
Study major – Systems engineering (INS)
Degree of the studies – first
Profile of the studies – general academic

The *systems engineering* major belongs to the field of education in technical sciences.

Effects of education on the major on the 1st degree of the studies	DESCRIPTION OF EFFECTS OF EDUCATION ON THE MAJOR After graduation from the 1st degree studies, major: systems engineering, the graduate can be characterised with the following knowledge and abilities:	Reference to the effects of education for the field of technical sciences
	KNOWLEDGE	
K1_INS_W01	basic knowledge with regard to mathematics, including compound numbers, polynomials, matrix calculation using sets of linear equations, analytical geometry, calculus, functions of one and many variables, basics of discrete mathematics – needed to understand and build formal descriptions of technical and nontechnical systems as well as elementary problems of analysis and synthesis for systems of various nature	T1A_W01
K1_INS_W02	basic knowledge with regard to classical mechanics, quantum mechanics, wave motion; phenomenological thermodynamics, transport phenomena	T1A_W01
K1_INS_W03	knowledge with regard to creation of mathematical models of systems, including linear and non-linear continuous and discrete descriptions, among others, using state variables	T1A_W03 T1A_W04
K1_INS_W04	knows standard statistical methods and IT tools of collection, analysis and presentation of data and simulation results pertaining to systems of various nature; understands standard econometric methods supporting decision-making processes; knows principles of validation and sensitivity and analysis of mathematical models as well as planning experiments	T1A_W03 T1A_W04 T1A_W07
K1_INS_W05	basic knowledge regarding identification of static and dynamic objects in deterministic and random conditions	T1A_W03 T1A_W04
K1_INS_W06	arranged knowledge with regard to analytical, numeric and heuristic optimisation methods, including non-linear, integer and global optimisation and using them to support decision-making	T1A_W03 T1A_W04
K1_INS_W07	fundamental knowledge of methods and systems supporting decision-making processes, especially in conditions of risk and uncertainty, group decisions, multi-aspect decisions – necessary to support decision-making in systems composed of technical subsystems and of human teams	T1A_W03 T1A_W04 T1A_W07 T1A_W09
K1_INS_W08	fundamental knowledge with regard to basics of computer science, in particular knows the term algorithm, models of data	T1A_W02

	and systems with databases	
K1_INS_W09	fundamental knowledge with regard to basics of control and automation	T1A_W02
K1_INS_W10	knows basic artificial intelligence methods, their properties and application, in particular concerning acquisition of knowledge from data and reasoning	T1A_W02
K1_INS_W11	basic specialist knowledge related to the chosen type of system	T1A_W02
K1_INS_W12	knowledge of forecasting development of science, and technologies and methods used in it; knows and is able to describe basic innovative processes occurring in an organisation; knows the current condition and development trends in systems engineering	T1A_W05
K1_INS_W13	basic knowledge with regard to symbolic representation of objects and their geometry and stereometry	T1A_W02
K1_INS_W14	fundamental knowledge of basic technical systems and methods of their combination to implement the adopted objective; familiar with the notion of technological cycle, characteristics of parameters of product depending on the expenses on B&R sector	T1A_W02 T1A_W03
K1_INS_W15	familiar with the essence of an enterprise, principles and areas of its operation and fundamental knowledge concerning factors influencing operations of enterprises; basic knowledge of management process; knows and understands basic notions and principles related to protection of industrial property and copyright	T1A_W08 T1A_W09 T1A_W10 T1A_W11
K1_INS_W16	understands basic principles of financial economy and accounting, knows tools as well as principles of construction and cognitive values of financial statements.	T1A_W03 T1A_W09 T1A_W11
K1_INS_W17	knowledge of design of systems using methods of systems engineering, principles of project management, project life cycle, construction of project teams as well as their organisation and functioning	T1A_W04 T1A_W06 T1A_W07 T1A_W09
K1_INS_W18	knows main elements of occupational health and safety management system; knowledge of possibility of counteracting harmful factors occurring at the workplace	T1A_W08
K1_INS_W19	knows basic notions, regularities and problems of marketing	T1A_W02
K1_INS_W20	knows main notions, laws and dependencies in the field of psychology as well as basic mechanisms of regulation of behaviours and methods of diagnosing them	T1A_W02
SKILLS		
K1_INS_U01	able to acquire information from traditional and electronic sources in Polish and in English with regard to systems engineering	T1A_U01
K1_INS_U02	able to work individually and in a team, able to pursue the schedule of an implemented project with observance of assumed terms	T1A_U02
K1_INS_U03	able to prepare documentation of engineering projects in Polish and in English	T1A_U03
K1_INS_U04	able to prepare a short oral presentation devoted to implementation of engineering project related to systems engineering in Polish and in English	T1A_U04

K1_INS_U05	capable of self-education, for instance, expand their knowledge and skills concerning a system of selected nature	T1A_U05
K1_INS_U06	speaks English to the extent corresponding to the requirements specified for level B2 of the European Language Education Description System – sufficient to communicate, use literature in English at basic level as well as operate specialist IT packages, operating manuals of devices and similar documents in English – in the field of technical sciences and the discipline relevant for the implemented path of education	T1A_U06
K1_INS_U07	able to correctly and effectively use knowledge with regard to linear algebra, analytical geometry, mathematical analysis and discrete mathematics in issues of analysis and decision-making in technical and nontechnical systems	T1A_U09 T1A_U10
K1_INS_U08	able to correctly and effectively use learned principles and laws physics to conduct qualitative and quantitative analysis of physical issues of engineering nature; able to plan and safely perform measurements, prepare measurement results, estimate the uncertainty of measured values of measurement quantities	T1A_U08
K1_INS_U09	able to build mathematical descriptions of elementary systems of various nature	T1A_U09
K1_INS_U10	able to use appropriate statistical methods and analytical tools supporting decision-making processes and use econometric models for analytical and prognostic purposes	T1A_U09 T1A_U15
K1_INS_U11	able to use standard statistical and econometric software, selected packages for simulation of systems as well as other specialist IT data processing tools to solve simple issues of analysis and decision-making	T1A_U08 T1A_U13 T1A_U14
K1_INS_U12	able to formulate and solve simple optimisation issues for systems with specific nature using specialised optimisation packages	T1A_U09 T1A_U15
K1_INS_U13	able to formulate and solve simple single and multi-criteria decision-making problems in complex technical, economic and mixed systems using linear, non-linear and integer optimisation algorithms as well as able to choose appropriate IT tools to solve them	T1A_U13 T1A_U15
K1_INS_U14	able to use basic information technologies as well as use basic IT tools to record and implement simple algorithms, designing and implementation of elementary databases	T1A_U07
K1_INS_U15	able to prepare simple Internet information systems as well as prepare and document simple IT systems	T1A_U07
K1_INS_U16	able to design a simple regulation system as well as examine its properties	T1A_U16
K1_INS_U17	able to use selected artificial intelligence IT tools	T1A_U09
K1_INS_U18	able to prepare and manage systems comprising people, information as well as financial and material resources using systems engineering tools	T1A_U10 T1A_U14 T1A_U15
K1_INS_U19	able to design and analyse operation of a chosen type of system considering the impact of other systems and, at the same time, observing efficiency requirements for elementary cases of such systems	T1A_U14 T1A_U15 T1A_U16
K1_INS_U20	able to graphically present messages, read technical documentation as well as dimension 3d objects	T1A_U14
K1_INS_U21	able to create simple development scenarios and formulate corresponding strategies	T1A_U10
K1_INS_U22	able to apply relevant methods and techniques to describe, analyse and interpret phenomena and processes taking place in an	T1A_U12

	enterprise; able to identify opportunities and hazards of economic and legal nature as well as determine their effects on operations of an enterprise; uses the principles valid under the rule of law	T1A_U13
K1_INS_U23	fundamental ability to manage accounting records; able to analyse financial statements; carries out initial assessment of economic profitability of undertaken engineering activities.	T1A_U12
K1_INS_U24	able to diagnose the environment and the working space as well as optimse working conditions permitting effective physical and mental activities; ability to assess the degree of encumbrance on a given work post	T1A_U11
K1_INS_U25	able to apply the principles of marketing planning in implementation of projects	T1A_U10 T1A_U11
K1_INS_U26	able to interpret behaviour in its natural context as well as assess own capabilities in the context of individual differences; able to use knowledge for own personality traits to shape own personal development	T1A_U10 T1A_U11
SOCIAL COMPETENCES		
K1_INS_K01	understands the need and knows possibilities of continuous additional education as well as continuation of education at second degree studies	T1A_K01
K1_INS_K02	able to think and operate in a system and enterprising manner being aware of the importance of extra-technical aspects of engineering projects	T1A_K02 T1A_K06
K1_INS_K03	able to cooperate in a group as a member and the leader as well as shows readiness to organise and manage the work of small teams	T1A_K03
K1_INS_K04	prepared to bear responsibility for entrusted tasks as part of performed roles	T1A_K02 T1A_K03 T1A_K04
K1_INS_K05	aware of importance of behaviour in a professional manner as well as compliance with the principles of professional ethics	T1A_K05
K1_INS_K06	understands the need of formulation and dissemination of opinions about technical, social, economic and legal determinants of engineering activities being aware of related responsibility	T1A_K02 T1A_K06 T1A_K07
K1_INS_K07	aware of indispensability of individual and team activities going beyond engineering activities	