## EFFECTS OF EDUCATION ON THE MAJOR

## **Department of Computer Science and Management**

Study major – Systems engineering (INS) Degree of the studies – second Profile of the studies – general academic

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

A person applying to be **enrolled with the second degree studies, major:** *systems engineering* must have qualifications of the first degree in the field of technical sciences and competences (KOMPT) necessary to continue education at second degree studies in this major, in particular:

- KOMPT 1. knowledge from **the field of mathematics and physics** making it possible to formulate and solve simple project tasks and understanding of physical basics of phenomena taking place in systems corresponding to the scope of completed 1st degree studies.
- KOMPT 2. Knowledge of **engineering graphics and engineering design** including: symbolic representation of objects and their geometry and stereometry, basics technical systems and ways of combining them to implement the adopted objective as well as skills allowing the graduate to: graphically present messages, read technical documentation, dimension 3d objects and design technical systems.
- KOMPT 3. Basic knowledge of **management, marketing and industrial property protection** regarding: principles of operation of an enterprise, areas of its functioning and factors affecting its functioning; management process; basic terms and principles related to protection of industrial property and copyright as well as basic terms, regularities and problems of marketing as well as skills in using relevant methods and techniques to describe, analyse and interpret phenomena and processes taking place in an enterprise, apply principles of marketing planning in implementation of projects as well as describe basic innovative processes taking place in an organisation.
- KOMPT 4. Knowledge and skills with regard to **basics of systems engineering** covering the issues of analysis of measurement data and computer simulation, optimisation and decision-making.
- KOMPT 5. Skills related to **basics of computer science** with regard to using basic information technologies, implementation of simple algorithms and designing and implementation of elementary databases.
- KOMPT 6. Specialist knowledge related to **the chosen type of system consistent with the major of completed 1st degree studies**, including that associated with development directions, roles of safety and life cycle of devices and systems as well as skills allowing the graduate to design and analyse actions of elementary cases of such systems.

The description of the effects of education for 2nd degree studies, major: *systems engineering*, does not refer to the following effects of education listed in the description of 2nd degree qualifications corresponding to the field of technical sciences (references to required 1st degree competences and qualifications ensuring their fulfilment have been provided in brackets):

knowledge: T2A\_W05 (KOMPT 4, 6), T2A\_W06 (KOMPT 6), T2A\_W08 (KOMPT 3), T2A\_W10 (KOMPT 3), T2A\_11 (KOMPT 3)

skills: T2A\_U07 (KOMPT 5), T2A\_U08 (KOMPT 4), T2A\_U13 (KOMPT 6), T2A\_U14 (KOMPT 3), T2A\_U15 (KOMPT 2), T2A\_U17 (KOMPT 3 KOMPT 4), T2A\_U19 (KOMPT 2)

social competences: T2A\_K03, T2A\_K04, T2A\_K05, T2A\_K07 (1st degree qualifications)

Effects ofDESCRIPTION OF EFFECTS OF EDUCATION ON THE MAJORReference to the
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education on 2nd	After graduation from the 2nd degree studies, major: systems engineering, the graduate can be characterised with the	effects of	
degree of the	following knowledge and abilities:	education for the	
studies		field of technical	
		sciences	
KNOWLEDGE			
K2_INS_W01	broadened knowledge with regard to creation of mathematical models of systems, including continuous and discrete, linear	T2A_W03	
	and non-linear descriptions, among others, using state variables	T2A_W04	
K2_INS_W02	broadened knowledge of methods and systems supporting decision-making processes, especially in conditions of risk and	T2A_W03	
	uncertainty, group decisions, multi-aspect decisions - necessary to support decision-making in systems composed of	T2A_W04	
	technical subsystems and of human teams	T2A_W07	
		T2A_W09	
K2_INS_W03	broadened and deepened knowledge with regard to some fields of mathematics, including ordinary differential and partial	T2A_W01	
	equations as well as stochastic processes with discrete and continuous time – needed to understand and build formal		
	descriptions of technical and nontechnical systems as well as solve elementary problems of analysis and synthesis for		
	systems of various nature		
K2_INS_W04	knowledge of basics of construction of invariances models in respect of dimensionally and tensorally homogenous	T2A_W03	
	measures used by the observer; knows basics of the theory of similarity		
K2_INS_W05	deepened knowledge of information techniques in knowledge engineering, including creation of mathematical models,	T2A_W02	
	processing data, information and knowledge as well as support for decision-making using selected techniques, tools and	T2A_W03	
	methods of artificial intelligence and soft calculations	T2A_W04	
K2_INS_W06	knowledge with regard to the European Union (EU) law, regarding in particular: sources and principles of the community	T2A_W02	
	law, adoption of community law, dependence between the EU law and national laws, control over the compliance with the		
	community law		
K2_INS_W07	knowledge with regard to: national economy, economic situation, monetary-credit system, inflation, role of the state in the	T2A_W02	
	economy, international trade, global economy, structure and forms of organisation on the market.		
SKILLS			
K2_INS_U01	able to acquire information from traditional and electronic sources in Polish and in English with regard to systems	T2A_U01	
	engineering, interpret and critically assess it as well as draw conclusions and formulate justified opinions	T2A_U06	
K2_INS_U02	able to work individually and in a team, able to pursue the schedule of an implemented project with observance of assumed	T2A_U02	
	terms and communicate using various techniques, also in English		
K2_INS_U03	able to prepare documentation of engineering projects completed by them in Polish and in English and present a relevant	T2A_U03	
	short oral presentation in English	T2A_U04	
		T2A_U06	
K2 INS U04	language skills in the field of field of technical sciences and discipline relevant for the implemented path of education –	T2A_U06	
	consistent with the requirements of the European Language Education Description System for level B2+ in the case of		
	English and for level A1 in the case of another foreign language		
K2 INS U05	capable of self-education, for instance, expand their knowledge and skills concerning a system of selected nature as well as	T2A U05	

	able to specify directions of further learning		
K2_INS_U06	able to build mathematical descriptions of complex systems of various nature	T2A_U09	
K2_INS_U07	able to use appropriate statistical methods and analytical tools supporting decision-making processes and use econometric	T2A_U09	
	models analytical and prognostic purposes as well as for the purposes of simple research problems	T2A_U18	
K2_INS_U08	able to formulate and solve simple optimisation aspects for systems with specific nature using specialised optimisation	T2A_U09	
	packages and be aware of the limitations of those tools	T2A_U18	
K2_INS_U09	uses the apparatus of differential equations to describe the properties of dynamic systems; use the apparatus of stochastic	T2A_U09	
	processes to describe and analyse non-deterministic dynamic processes		
K2_INS_U10	able to design research in laboratory and semi-technical scale	T2A_U09	
		T2A_U10	
K2_INS_U11	able to use selected tools of artificial intelligence and soft calculations to describe, analyse and make decisions, in	T2A_U09	
	particular for complex systems functioning in non-deterministic conditions.	T2A_U10	
K2_INS_U12	able to analyse and interpret phenomena and processes in the macroeconomic scale,	T2A_U10	
K2_INS_U13	able to design a simple technological system	T2A_U11	
		T2A_U12	
		T2A_U16	
K2_INS_U14	able to formulate and examine different options of solution of a selected issue of analysis and decision-making for the	T2A_U11	
	selected type of system consistent with the implemented path of education and taking account of the impact of other		
	systems		
K2_INS_U15	able to choose proper methods and algorithm in the field of systems engineering and adjust them to solve the problem and	T2A_U16	
	analyse (or) make decisions for the selected type of system		
K2_INS_U16	able to rationally apply systems engineering methods in order to effectively design and analyse the chosen type of system	T2A_U12	
	(consistent with the major of completed studies 1st degree studies), taking account of the impact of other systems		
SOCIAL COMPETENCES			
K2_INS_K01	understands the need and knows possibilities of continuous additional education, in particular enrolling with third degree	T2A_K01	
	studies in order to improve personal, professional and social competences		
K2_INS_K02	able to think in a system manner and creatively employ advanced systems engineering methods being aware of the	T2A_K02	
	importance extra-technical aspects of engineering projects, including environmental protection requirements	T2A_K06	