BIALYSTOK UNIVERSITY OF TECHNOLOGY

Study programme

automatic control and robotics

full-time Master's degree

seventh level of the Polish Qualifications Framework

Białystok 2019

Table of references of course outcomes to the field outcomes for master degree in *Automatic Control and Robotics* to the second degree characteristic of Polish NQF (Polskiej Ramy Kwalifikacji) levels 6-8 and universal characteristics defined in Polish law established on 22nd of December 2015 (Ustawa z dnia 22 grudnia 2015 r. o Zintegrowanym Systemie Kwalifikacji).

Explanation of the table symbols:

EEE1_Xxx – course outcomes of learning for maser degree in *Automatic Control and Robotics*, X: W – knowledge category, U – skills category, K – social competences category, xx – number of the learning outcome;

P7S – outcomes of education for master degree according to Polish NQF (Polska Rama Kwalifikacji) (qualifications achieved with higher education – LEVEL 7, general-academic profile, engineer competences)**.**

Symbol of the learning outcome for *ACR*	Description of the course education outcomes – study programme *Automatic Control and Robotics*, Master degree, general-academic profile, engineering studies. After finishing studies the graduate:	Reference to the second level characteristic of Polish NQF – level 7 for technical sciences (P7S)	Reference to the second level characteristic of Polish NQF – level 7 for engineer competences
Knowledge: knows and understands			
AR2_W01	in a deepened degree mathematical and physical theories, methods and models, and relationships between them in automatic control and robotics systems	P7S_WG, P7U_W	P7S_WG
AR2_W02	in a deepened degree processes occurring in the life cycle of devices, facilities and technical systems in the field of automatic control and robotics	P7S_WG, P7U_W	P7S_WG
AR2_W03	in a deepened degree selected facts, objects and phenomena and their methods and theories explaining the complex relationships between them in automatic control and robotics systems	P7S_WG, P7U_W	P7S_WG
AR2_W04	in a deepened degree principles of designing automatic control and robotics systems as well as supporting engineering tools and computer methods	P7S_WG, P7U_W	P7S_WG
AR2_W05	in a deepened degree theories, methods and engineering tools necessary to manage the operation of automatic control and robotics systems	P7S_WG, P7U_W	P7S_WG
AR2_W06	in a deepened degree principles of conducting research, experiments and simulations, analysis, interpretation and presentation of the results obtained	P7S_WG, P7U_W	P7S_WG
AR2_W07	latest development trends in the field of automatic control and robotics	P7S_WG, P7U_W	P7S_WG

AR2_W08	economic, legal, ethical, civilization and other conditions of various types of activities related to automatic control and robotics	P7S_WK, P7U_W	
AR2_W09	principles of protection of industrial property and copyright	P7S_WK, P7U_W	
AR2_W10	rules for creating and developing forms of individual entrepreneurship	P7S_WK, P7U_W	P7S_WK
Skills: can			
AR2_U01	use knowledge from various fields of science to formulate and solve complex, unusual problems, and innovatively perform and at least partially implement in practice the tasks appropriate for automatic control and robotics	P7S_UW, P7U_U	P7S_UW
AR2_U02	properly choose sources and information derived from them, make their assessment, critical analysis and synthesis, and creative interpretation and presentation of this information in the field of automatic control and robotics	P7S_UW, P7U_U	P7S_UW
AR2_U03	select and use advanced methods and tools, including information and communication techniques in automatic control and robotics systems	P7S_UW, P7U_U	P7S_UW
AR2_U04	plan and perform research, experience or observations on cognitive issues in the field of automatic control and robotics	P7S_UW, P7U_U	P7S_UW
AR2_U05	critically evaluate the results of research, experiments, computer simulations, observations and theoretical calculations, as well as discuss measurement errors and the possibilities of optimizing the procedures used in automatic control and robotics systems	P7S_UW, P7U_U	P7S_UW
AR2_U06	apply the acquired knowledge in the field of automatic control and robotics to solve problems related to similar scientific disciplines	P7S_UW, P7U_U	P7S_UW
AR2_U07	make economic assessment of the proposed technical solutions, notice their systemic and non-technical aspects in automatic control and robotics systems	P7S_UW, P7U_U	
AR2_U08	communicate on specialist topics specific to automatic control and robotics engineer with diverse recipients, and lead the debate	P7S_UK, P7U_U	

AR2_U09	use a foreign language at at least B2+ level of the European System of Language Description in the area of specialist terminology, for the free use of professional literature, as well as the preparation and presentation of presentations on the implementation of a project or research task	P7S_UK, P7U_U	
AR2_U10	manage the team's work, plan and implement lifelong learning and guide others in this area	P7S_UO, P7S_UU, P7U_U	
Social competences: is ready to			
AR2_K01	analyze on its merits the received content and for its critical evaluation	P7S_KK, P7U_K	
AR2_K02	use expert opinions and recognize the importance of knowledge in the field of technical sciences and humanities, economics and social sciences necessary in solving cognitive and practical problems	P7S_KK, P7U_K	
AR2_K03	meet social needs, undertake and coordinate initiatives for the social environment	P7S_KO, P7U_K	
AR2_K04	act for the public interest	P7S_KO P7U_K	
AR2_K05	think and act in an entrepreneurial way in the field of professional roles	P7S_KO, P7U_K	
AR2_K06	responsibly fulfill professional duties, continuously train in issues related to the nature of professional roles	P7S_KR, P7U_K	
AR2_K07	comply with the rules of professional ethics and take steps to comply with these principles by subordinate personnel	P7S_KR, P7U_K	

Study programme for full-time studies *Automatic Control and Robotics*

Full-time study programme

Study programme: *Automatic Control and Robotics*

Master degree, general-academic profile

Semester I

No	Module ID	Module name	Hours of teaching						ECTS
			L	C	LC	SW	P	Total	
1	MYAR2S01001	Optimization methods	30	--	--	15	--	45	3
3	MYAR2S01002	Control theory (E)	30	30	--	15	--	75	6
4	MYAR2S01003	Real time controllers	15	--	--	30	--	45	4
5	MYAR2S01004	Artificial intelligence systems	30	--	--	--	15	45	3
6	MYAR2S01005	Signal and image processing	30	--	30	--	--	60	5
8	MYAR2S01006	Control systems for robots (E)	15	--	30	--	--	45	4
9	MYAR2S01007	Identification of control systems	30	--	--	15	--	45	3
10	MYAR2S01008	Foreign language English (B2+) *	--	30	--	--	--	30	2
	MYAR2S01009	Foreign language English (C1) *							
	MYAR2S01010	Foreign language Russian *							
	MYAR2S01011	Foreign language German *							
Total			**180**	**60**	**60**	**75**	**15**	**390**	**30**

Semester II

No	Module ID	Module name	Hours of teaching						ECTS
			L	C	LC	SW	P	Total	
1		Specialization courses: industrial process control (2E) *	150	--	60	150	--	360	30
Total IPC			**150**	**0**	**60**	**150**	**0**	**360**	**30**
2		Specialization courses: computer systems (2E) *	150	--	45	135	30	360	30
Total CS			**150**	**0**	**45**	**135**	**30**	**360**	**30**

Semester III

No	Module ID	Module name	Hours of teaching						ECTS
			L	C	LC	SW	P	Total	
1	MYAR2S03001	Implementation of control algorithms	15	--	15	30	--	60	4
2	MYAR2S03002	Diploma seminar *	--	--	--	30	--	30	2
3	MYAR2S03003	Innovative enterprise and technology transfer *	15	15	--	--	--	30	3
4	MYAR2S03004	HES II, HES III (2 of 6): World economy *	2 x 15 = 30	--	--	--	--	30	2 x 1 = 2
	MYAR2S03005	Founding and financing of start-ups *							
	MYAR2S03006	Market investigations *							
	MYAR2S03007	Industrial marketing *							
	MYAR2S03008	Management of project teams *							
	MYAR2S03009	Management of career *							
5	MYAR2S03010	Specialistic lecture *	30	--	--	--	--	30	2
6	MYAR2S03011	Diploma thesis *	--	--	--	--	--	--	15
7	MYAR2S03012	Vocational training *	--	--	--	--	--	--	2
		Total	**90**	**15**	**15**	**60**	**0**	**180**	**30**

Specialization: industrial control

Semester II

No	Module ID	Module name	Hours of teaching						ECTS
			L	C	LC	SW	P	Total	
1	MYAR2S12001	Interim work project *	--	--	--	30	--	30	2
2	MYAR2S12002	Networked automation systems (E) *	30	--	15	15	--	60	5
3	MYAR2S12003	Testing of control systems *	15	--	30	--	--	45	4
4	MYAR2S12004	Decision support in technical diagnostics *	15	--	--	15	--	30	2
5	MYAR2S12005	Automation and robotization systems *	45	--	--	30	--	75	6
6	MYAR2S12006	Nonlinear control systems (E) *	30	--	--	30	--	60	6
7	MYAR2S12007	Control of manufacturing processes *	15	--	15	30	--	60	5
		Total	**150**	**0**	**60**	**150**	**0**	**360**	**30**

Specialization: informatics systems

Semester II

Lp.	Kod przedmiotu	Nazwa przedmiotu	Liczba godzin						Punkty ECTS
			W	C	L	P	Ps	Suma	
1	MYAR2S22001	Interim work project *	--	--	--	30	--	30	2
2	MYAR2S22002	Ethernet industrial networks (E) *	30	--	15	15	--	60	5
3	MYAR2S22003	Artificial neural networks and expert systems (E) *	30	--	--	--	30	60	5
4	MYAR2S22004	Cooperation of robots *	15	--	--	30	--	45	4
5	MYAR2S22005	Intelligent technical systems *	15	--	--	30	--	45	4
6	MYAR2S22006	Automation systems *	30	--	--	15	--	45	4
7	MYAR2S22007	Autonomous systems *	30	--	30	15	--	75	6
		Total	**150**	**0**	**45**	**135**	**30**	**360**	**30**