BIALYSTOK UNIVERSITY OF TECHNOLOGY

Study programme

automatic control and robotics

full-time Bachelor's degree

sixth level of the Polish Qualifications Framework

Białystok 2019

Table of references of course outcomes to the field outcomes for **bachelor** 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;

P**6**S – outcomes of education for **bachelor** degree according to Polish NQF (Polska Rama Kwalifikacji) (qualifications achieved with higher education – LEVEL **6**, general-academic profile, engineer competences).

Symbol of the learning outcome for *ACR*	Description of the course education outcomes – study programme *Automatic Control and Robotics*, Bachelor degree, general-academic profile, engineering studies. After finishing studies the graduate:	Reference to the second level characteristic of Polish NQF – level 6 for technical sciences (P6S)	Reference to the second level characteristic of Polish NQF – level 6 for engineer competences
Knowledge: knows and understands			
AR1_W01	selected processes occurring in the life cycle of devices, objects and systems of automatic control and robotics	P6S_WG, P6U_W	P6S_WG
AR1_W02	advanced issues in mathematics and physics, as well as mathematical and physical models and relationships between them necessary to describe physical phenomena and processes occurring in devices, objects and systems of automatic control and robotics	P6S_WG, P6U_W	P6S_WG
AR1_W03	selected principles, methods and tools for the analysis and selection of mechanical components and systems used in devices, objects and systems of automatic control and robotics	P6S_WG, P6U_W	P6S_WG
AR1_W04	information and communication techniques used in automatic control and robotics systems	P6S_WG, P6U_W	P6S_WG
AR1_W05	methods of selecting and using information sources as well as appropriate engineering methods and tools, including measuring methods and systems for formulating and solving basic problems of automatic control and robotics, and drawing conclusions	P6S_WG, P6U_W	P6S_WG
AR1_W06	issues in the theory of electrical circuits, operation of electrical and electronic devices, signal theory and selected phenomena accompanying the functioning of automatic control and robotics systems	P6S_WG, P6U_W	P6S_WG

AR1_W07	principles of technical drawing and principles of designing selected devices, objects and systems of automatic control and robotics as well as supporting engineering tools and computer methods	P6S_WG, P6U_W	P6S_WG
AR1_W08	practical examples of implementation of methods used to solve typical engineering problems in the field of automatic control and robotics	P6S_WG, P6U_W	P6S_WG
AR1_W09	basic economic and legal principles of creating and developing forms of individual entrepreneurship as well as the principles of interpersonal and social communication as well as basic dilemmas of modern civilization	P6S_WK, P6U_W	P6S_WK
AR1_W10	principles of industrial property and copyright protection as well as basic principles of occupational health and safety at work and study positions	P6S_WK, P6U_W	P6S_WK
AR1_W11	methods of planning individual and team work, the need to improve qualifications and methods of inference and presenting opinions	P6S_WG, P6S_WK, P6U_W	
Skills: can			
AR1_U01	use knowledge from various fields of science to analyze, formulate and solve complex or unusual automatic control and robotics problems	P6S_UW, P6U_U	P6S_UW
AR1_U02	choose sources and information contained therein correctly, assess them, critically analyze and synthesize them and use them to solve technical problems	P6S_UW, P6U_U	P6S_UW
AR1_U03	select and use appropriate methods and tools, including advanced information and communication techniques in automatic control and robotics systems	P6S_UW, P6U_U	P6S_UW
AR1_U04	plan and conduct experiments, including computer measurements and simulations, interpret obtained results and draw conclusions, formulate opinions	P6S_UW, P6U_U	P6S_UW
AR1_U05	make an initial economic assessment of the proposed solutions, undertaken engineering actions, recognize their systemic and non-technical aspects, as well as evaluate and make a critical analysis of the functioning of existing technical solutions in devices, objects and systems of automatic control and robotics	P6S_UW, P6U_U	P6S_UW
AR1_U06	design according to the given specification and implement a simple device, object or system of automatic control and robotics	P6S_UW, P6U_U	P6S_UW

AR1_U07	design a control system for a selected industrial process	P6S_UW, P6U_U	P6S_UW
AR1_U08	perform analysis and selection of mechanical components and systems in devices, objects and systems of automatic control and robotics	P6S_UW, P6U_U	
AR1_U09	communicate, exchange opinions, including taking part in a specialized debate in the field of automatic control and robotics	P6S_UK, P6U_U	
AR1_U10	use a foreign language at least at B2 level of the European Language Description System, including communicate in an international engineering environment	P6S_UK, P6U_U	
AR1_U11	plan, organize individual work, in a team and plan professional development to constantly keep up with trends in the field of automatic control and robotics	P6S_UO, P6S_UU, P6U_U	
AR1_U12	apply the principles of health and safety at work	P6S_UW P6U_U	P6S_UW
Social competences: is ready to			
AR1_K01	critically assess his/her knowledge, improve professional qualifications, self-education	P6S_KK, P6S_KR, P6U_K	
AR1_K02	recognize the importance of knowledge and use of expert opinions in solving engineering problems, accepting responsibility for tasks carried out	P6S_KK, P6S_KO, P6U_K	
AR1_K03	fulfill social obligations, respect the diversity of views and cultures, co-organize environmental activities	P6S_KO, P6U_K	
AR1_K04	think and act in an entrepreneurial manner in fulfilling professional duties	P6S_KO, P6U_K	
AR1_K05	behave in a professional manner, adhere to the principles of professional ethics, care for the achievements and traditions of the engineering profession	P6S_KR, P6U_K	

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

Full-time study programme

Study programme: ***Automatic Control and Robotics***

Bachelor degree, general-academic profile

Semester I

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS01001	Mathematics I (E)	45	45	--	--	90	8
2	MYARS01002	Technical drawing in electrical engineering	15	--	--	30	45	3
3	MYARS01003	Technical drawing in mechanical engineering	15	--	--	30	45	3
4	MYARS01004	Engineering materials (E)	30	--	15	--	45	4
5	MYARS01005	Operating systems: Linux and Android	15	--	--	30	45	4
6	MYARS01006	Computer networks (E)	15	--	--	30	45	4
7	MYARS01007	Occupational safety and health	15	--	--	--	15	1
8		HES I *	15	--	--	--	15	1
9		HES II *	15	--	--	--	15	1
10		HES III *	15	--	--	--	15	1
		Total	**195**	**45**	**15**	**120**	**375**	**30**

Semesttr II

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS02001	Mathematics II (E)	60	45	--	-	105	8
2	MYARS02002	Physics (E)	30	30	--	--	60	5
3	MYARS02003	Technical mechanics	30	30	15	--	75	6
4	MYARS02004	Electrotechnics and electronics (E)	30	30	15	--	75	6
5	MYARS02005	Programming in C	15	--	--	30	45	3
6	MYARS02006	Foreign language I English *	--	30	--	--	30	2
	MYARS02007	Foreign language I Russian *						
	MYARS02008	Foreign language I German *						
		Total	**165**	**165**	**30**	**30**	**390**	**30**

Semester III

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS03001	Fundamentals of robotics (E)	30	15	30	--	75	7
2	MYARS03002	Kinematics and dynamics of mechanisms	15	--	--	15	30	3
3	MYARS03003	Electric drive systems (E)	15	--	30	--	45	4
4	MYARS03004	Computer aided design in mechanical engineering	15	--	--	30	45	4
5	MYARS03005	Signal theory (E)	30	--	--	15	45	4
6	MYARS03006	Programming in C++	15	--	--	30	45	3
7	MYARS03007	Programming of embedded systems	15	--	30	--	45	3
8	MYARS03008	Foreign language II English *	--	30	--	--	30	2
	MYARS03009	Foreign language II Russian *						
	MYARS03010	Foreign language II German *						
		Total	**135**	**45**	**90**	**90**	**360**	**30**

Semester IV

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS04001	Fundamentals of process control (E)	45	30	30	--	105	8
2	MYARS04002	Fundamentals of robots design (E)	30	--	--	30	60	6
3	MYARS04003	Programming of PLCs (E)	30	--	--	45	75	6
4	MYARS04004	Computer aided design in electrotechnics	15	--	--	30	45	4
5	MYARS04005	Fluid drive systems	15	--	30	--	45	4
6	MYARS04006	Foreign language III English *	--	30	--	--	30	2
	MYARS04007	Foreign language III Russian *						
	MYARS04008	Foreign language III German *						
		Total	**135**	**60**	**60**	**105**	**360**	**30**

Semester V

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS05001	Visualization of industrial processes	15	--	--	30	45	4
2	MYARS05002	Programmable logic devices	15	--	--	30	45	3
3	MYARS05003	Instrumentation of control systems (E)	30	--	30	--	60	5
4	MYARS05004	Computer measurement systems	15	--	30	--	45	4
5	MYARS05005	Physical education I	--	30	--	--	30	0
6	MYARS05006	Foreign language IV English *	--	30	--	--	30	2
	MYARS05007	Foreign language IV Russian *						
	MYARS05008	Foreign language IV German *						
		Total	**75**	**60**	**60**	**60**	**255**	**18**
		Specialization courses - mobile robots (2E) *	60	0	30	45	135	12
		Total	**135**	**60**	**90**	**105**	**390**	**30**
		Specialization courses - automation and computerization of processes (2E) *	60	0	15	60	135	12
		Total	**135**	**60**	**75**	**120**	**390**	**30**

Semester VI

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS06001	Automation of processes (E)	30	--	--	30	60	5
2	MYARS06002	Fundamentals of telecommunications	15	--	15	--	30	3
3	MYARS06003	Physical education II	--	30	--	--	30	0
4	MYARS06004	Specialistic lecture *	30	--	--	--	30	3
		Total	**75**	**30**	**15**	**30**	**150**	**11**
		Specialization courses - mobile robots (2E) *	75	0	15	120	210	19
		Total	**150**	**30**	**30**	**150**	**360**	**30**
		Specialization courses - automation and computerization of processes (2E) *	75	0	0	135	210	19
		Total	**150**	**30**	**15**	**165**	**360**	**30**

Semester VII

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS07001	Diploma seminar *	--	--	--	30	30	3
2	MYARS07002	Diploma thesis *	--	--	--	--	0	16
3	MYARS07003	Vocational training *	--	--	--	--	0	4
4	MYARS07004	Intelectual property protection	15	--	--	--	15	1
5		HES IV *	15	--	--	--	15	1
6		HES V *	15	--	--	--	15	1
		Total	**45**	**0**	**0**	**30**	**75**	**26**
		Specialization courses - mobile robots *	15	0	30	0	45	4
		Total	**60**	**0**	**30**	**30**	**120**	**30**
		Specialization courses - automation and computerization of processes *	15	0	30	0	45	4
		Total	**60**	**0**	**30**	**30**	**120**	**30**

HES

	Module ID	Module name	ECTS
HES I	MYARS01008	Psychology *	1
HES II	MYARS01009	Sociology *	1
HES III	MYARS01010	Economy for engineers *	1
	MYARS01011	Accounting for engineers *	1
	MYARS01012	History of technology *	1
3 of 6	MYARS01013	Environmental management and ecology *	1

	Kod przedmiotu	Nazwa przedmiotu	ECTS
HES IV	MYARS07005	Fundamentals of business process management *	1
HES V	MYARS07006	Tax law *	1
	MYARS07007	Quality management *	1
	MYARS07008	Management of production *	1
2 z/of 5	MYARS07009	Theory of solving innovative problems *	1

Specialization: mobile robots

Semester V

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS15001	Robotics (E) *	30	--	--	30	60	5
2	MYARS15002	Signal processing systems in robotics (E) *	15	--	--	15	30	3
3	MYARS15003	Programming of robots *	15	--	30	--	45	4
		Total	**60**	**0**	**30**	**45**	**135**	**12**

Semester VI

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS16001	Fundamentals of grippers design *	15	--	--	15	30	3
3	MYARS16002	Robotized production systems (E) *	15	--	--	30	45	4
4	MYARS16003	Programming of mobile applications *	15		--	30	45	4
5	MYARS16004	Measurement systems in robotics (E) *	30	--	15	15	60	5
6	MYARS16005	Interim work project *	--	--	--	30	30	3
		Total	**75**	**0**	**15**	**120**	**210**	**19**

Semester VII

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS17001	Navigation of mobile robots *	15	--	30	--	45	4
		Total	**15**	**0**	**30**	**0**	**45**	**4**

Specialization: automation and computerization of processes

Semester V

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS25001	Robotics (E) *	30	--	15	30	75	7
2	MYARS25002	Modeling and simulation of control systems (E) *	30	--	--	30	60	5
		Total	**60**	**0**	**15**	**60**	**135**	**12**

Semester VI

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS26001	Intelligent control systems (E) *	30	--	--	30	60	5
2	MYARS26002	Decentralized control systems (E) *	30	--	--	45	75	7
3	MYARS26003	Data reporting and analysis *	15	--	--	30	45	4
4	MYARS26004	Interim work project *	--	--	--	30	30	3
		Total	**75**	**0**	**0**	**135**	**210**	**19**

Semester VII

No	Module ID	Module name	Hours of teaching					ECTS
			L	C	LC	P	Total	
1	MYARS27001	Automation of electrical drive systems *	15	--	30	--	45	4
		Total	**15**	**0**	**30**	**0**	**45**	**4**