

DESCRIPTION OF THE PROGRAM OF STUDIES

1. Description

<p>1.1 Number of semesters: 3</p>	<p>1.2 Total number of ECTS points necessary to complete studies at a given level: 90</p>
<p>1.3 Total number of hours: 1080</p>	<p>1.4 Prerequisites (particularly for second-level studies): Completed first or second level degree program in the field of study which the curriculum contains issues from the Fundamentals of Control or Control Theory and contents of at least one of the courses: Electric Drive, Robotics Basics, Microprocessor Technology, Electrical Engineering in the field of "Electric and Magnetic Circuits"</p>
<p>1.5 Upon completion of studies graduate obtains professional degree of: master of science, engineer</p>	<p>1.6 Graduate profile, employability: A graduate of the second level studies has an advanced knowledge and practical skills needed for creative action in the analysis, design and construction of automation circuits and systems, control and programming of industrial automation systems, and the design of decision support systems. A graduate of the second level studies in specialization "Automation and Control in Electrical Power Engineering", is especially educated to design and operate control systems in electrical power systems, utilizing modern digital techniques and intelligent systems. A graduate of the second level studies is prepared to lead workers teams in industrial units and is well prepared for the design and research work. He has acquired habits of lifelong learning and constant professional development. He can continue education qualifying for doctoral school.</p>
<p>1.7 Possibility of continuing studies: Doctoral School</p>	<p>1.8 Indicate connection with University's mission and its development strategy: The knowledge gained during studies will not only lead to success in future professional career of the graduate, but also shapes the human being with a sense of entrepreneurship, creativeness and openness to new challenges.</p>

2. Detailed description:

2.1 Total number of learning outcomes in the program of study:

W (knowledge) = 20

U (skills) = 20

K (competences) = 7

W + U + K = 47

2.2 For the main field of study assigned to more than one discipline - the number of learning outcomes assigned to the discipline:

D1 (major): 47

2.3 For the field of study assigned to more than one discipline - percentage share of the number of ECTS points for each discipline:

D1 100 % ECTS points

2.4a. For the general academic profile field of study – the number of ECTS points assigned to the classes related to the University's academic activity in the discipline or disciplines to which the faculty is assigned:

82 ECTS

2.5. Concise analysis of compliance of the assumed learning outcomes with the needs of the labor market:

Current needs of the labor market are related to the industry, which is characterized by a high degree of automation and robotics. Graduates of second level studies in Industrial Control Engineering are trained to design and retrofit automatic control systems used in various industrial processes, with particular emphasis on automation machinery, vehicles, apparatus, and power systems. Due to acquired knowledge and practical skills in the field of industrial automation and power system automation, graduates are prepared to work in R & D centers and at decisive positions, are skilled to fulfill management duties in industry and design centers.

2.6. The total number of ECTS points that a student must obtain in classes requiring direct participation of academic teachers or other persons conducting classes and students (enter the sum of ECTS points for courses / groups of courses marked with the BK1 code)

63 ECTS

2.7. Total number of ECTS points, which student has to obtain from basic sciences classes

Number of ECTS points for obligatory subjects	8
Number of ECTS points for optional subjects	0
Total number of ECTS points	8

2.8. Total number of ECTS points, which student has to obtain from practical classes, including laboratory classes

Number of ECTS points for obligatory subjects	19
Number of ECTS points for optional subjects	28
Total number of ECTS points	47

2.9. Minimum number of ECTS points, which student has to obtain doing education blocks offered as part of university-wide classes or other main field of study

8 ECTS points

2.10. Total number of ECTS points, which student may obtain doing optional blocks (min. 30% of total number of ECTS points)

36 ECTS points

3. Description of the process leading to learning outcomes acquisition:

The student should be familiarized by the academic teacher with the initial requirements for the course, assumed learning outcomes and the course program, the lecturer should indicate the need for regular student work and motivate him to think independently and draw conclusions during the didactic classes.

4.1.2. List of basic sciences blocks

4.1.2.1. Mathematics block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	APR011309W	Mathematical optimisation	2					K2APR_W1	30	90	3	2,1	T	E			PD	OB
2	APR011309L	Mathematical optimisation			1			K2APR_U1 K2APR_K6	15	60	2	1,4	T	Z		P	PD	OB
Total			2	0	1	0	0		45	150	5	3,5						

4.1.2.2. Physics block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	APR012511W	Control object identification	2					K2APR_W4 K2APR_K2	30	60	2	1,4	T	Z			PD	OB
2	APR012511L	Control object identification			1			K2APR_U3 K2APR_K2	15	30	1	0,7	T	Z		P	PD	OB
Total			2	0	1	0	0		45	90	3	2,1						

4.1.2.3. Chemistry block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type

Altogether for basic sciences blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points
lec	cl	lab	pr	sem				
4	0	2	0	0	90	240	8	5,6

4.1.3. List of main-field-of-study blocks

4.1.3.1. Obligatory main-field-of-study block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	APR012111W	Fundamentals of system modelling	1					K2APR_W2	15	30	1	0,7	T	Z			K	OB
2	APR012111L	Fundamentals of system modelling			1			K2APR_U2 K2APR_K1 K2APR_K2	15	30	1	0,7	T	Z		P	K	OB
3	APR012112W	Control theory	2					K2APR_W2 K2APR_W1 K2APR_W3 K2APR_K1 K2APR_K2 K2APR_K3 K2APR_K4	30	90	3	2,1	T	E			K	OB
Total			3	0	1	0	0		60	150	5	3,5						

Altogether for main-field-of-study blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points
lec	cl	lab	pr	sem				
3	0	1	0	0	60	150	5	3,5

4.1.4. List of specialization blocks

4.1.4.1. Obligatory specialization subjects block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	APR012113W	Digital techniques in power system control and protection	1					S2ASE_W4 K2APR_W4 K2APR_W2 S2ASE_W6	15	30	1	0,7	T	Z			S	OB
2	APR012113P	Digital techniques in power system control and protection				1		K2APR_U2 S2ASE_U3 S2ASE_U6 K2APR_U3 K2APR_K6 K2APR_K7	15	30	1	0,7	T	Z		P	S	OB
3	APR012115W	Artificial intelligence in power system protection and control	2					S2ASE_W7	30	120	4	2,8	T	E			S	OB
4	APR012115P	Artificial intelligence in power system protection and control				1		S2ASE_U5 K2APR_K6 K2APR_K7	15	30	1	0,7	T	Z		P	S	OB
5	APR012116W	Fundamentals of digital power system protection and control	2					S2ASE_W8	30	120	4	2,8	T	E			S	OB
6	APR012116L	Fundamentals of digital power system protection and control			2			S2ASE_U6 K2APR_K2 K2APR_K7	30	60	2	1,4	T	Z		P	S	OB
7	APR012117L	Microprocessor controllers in electrical power engineering			2			S2ASE_U10 K2APR_K6 K2APR_K7	30	60	2	1,4	T	Z		P	S	OB
8	APR012118W	Electromagnetic transients simulation	1					K2APR_W2 K2APR_W3 S2ASE_W6	15	30	1	0,7	T	Z			S	OB
9	APR012118P	Electromagnetic transients simulation				1		K2APR_U2 K2APR_U3 S2ASE_U4 K2APR_K2	15	30	1	0,7	T	Z		P	S	OB
10	APR012211W	Electric power system control and operation	2					S2ASE_W1	30	60	2	1,4	T	Z			S	OB
11	APR012211L	Electric power system control and operation			1			S2ASE_U1 K2APR_K2	15	30	1	0,7	T	Z		P	S	OB

12	APR012214W	Fiber Optics	2					S2ASE_W2 K2APR_K6	30	30	1	0,7	T	Z			S	OB
13	APR012311W	Devices and control standards of electrical installations	2					S2ASE_W9 K2APR_K6	30	120	4	2,8	T	E			S	OB
14	APR012311C	Devices and control standards of electrical installations		2				S2ASE_U7 K2APR_K6	30	60	2	1,4	T	Z		P	S	OB
15	APR012312W	Intelligent building automation	1					S2ASE_W11	15	30	1	0,7	T	Z			S	OB
16	APR012312L	Intelligent building automation			1			S2ASE_U9 K2APR_K7	15	30	1	0,7	T	Z		P	S	OB
17	APR012312P	Intelligent building automation				2		S2ASE_U7 S2ASE_U9	30	60	2	1,4	T	Z		P	S	OB
18	APR012512W	Automation of electric power systems	2					S2ASE_W1 S2ASE_W3	30	120	4	2,8	T	E			S	OB
19	APR012512L	Automation of electric power systems			1			S2ASE_U2 K2APR_K6	15	30	1	0,7	T	Z		P	S	OB
20	APR012513W	Computer Control of Power System	2					S2ASE_W5	30	60	2	1,4	T	Z			S	OB
21	APR012513S	Computer Control of Power System					1	S2ASE_U1 S2ASE_U8 K2APR_K6	15	30	1	0,7	T	Z		P	S	OB
22	APR012514W	Load management	2					S2ASE_W10 K2APR_K4	30	60	2	1,4	T	Z			S	OB
			Total	19	2	7	5	1	510	1230	41	28,7						

Altogether for specialization blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points
lec	cl	lab	pr	sem				
19	2	7	5	1	510	1230	41	28,7

4.2. List of optional blocks

4.2.1. List of general education blocks

4.2.1.1. Liberal-managerial subjects block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	FLH051621S	Ethics in bussiness					1	K2APR_U6 K2APR_K6	15	50	2	1,4	T	Z	O	P	KO	W
2	PKH050421S	Social communication					1	K2APR_U6 K2APR_K6	15	50	2	1,4	T	Z	O	P	KO	W
3	PKH050521S	The art of public speaking					1	K2APR_U6 K2APR_K6	15	50	2	1,4	T	Z	O	P	KO	W
4	PRR051216W	Standardization and engineering law	1					K2APR_W6 K2APR_K3 K2APR_K5	15	25	1	0,7	T	Z	O		KO	W
5	PRR051217W	Engineering law	1					K2APR_W6 K2APR_K3 K2APR_K5	15	25	1	0,7	T	Z	O		KO	W
6	PRR051218W	Technical Standardization	1					K2APR_W6 K2APR_K3 K2APR_K5	15	25	1	0,7	T	Z	O		KO	W
7	ZMR052513W	Management of a Company	1					K2APR_W5 K2APR_K3 K2APR_K6	15	50	2	1,4	T	Z	O		KO	W
8	ZMR052521W	Management in the power industry	1					K2APR_W5 K2APR_K3 K2APR_K6	15	50	2	1,4	T	Z	O		KO	W
			Total	2	0	0	0	1	45	125	5	3,5						

4.2.1.2. Foreign languages block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	JZL100709BKC	Foreign language B2+ or C1+		1				K2APR_U4 K2APR_K1	15	30	1	0,7	T	Z	O	P	KO	W
2	JZL100710BKC	Foreign language A1 or A2		3				K2APR_U5 K2APR_K1	45	60	2	1,4	T	Z	O	P	KO	W
Total			0	4	0	0	0		60	90	3	2,1						

4.2.1.3. Sporting classes block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type

4.2.1.4. Information technologies block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type

Altogether for general education blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points
lec	cl	lab	pr	sem				
2	4	0	0	1	105	215	8	5,6

4.2.3. List of main-field-of-study blocks

4.2.3.1. Optional main-field-of-study subjects block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type

Altogether for main-field-of-study blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points
lec	cl	lab	pr	sem				
0	0	0	0	0	0	0	0	0

4.2.4. List of specialization blocks

4.2.4.1. Specialization subjects block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	APR011101W	Electromagnetic Compatibility	2					S2ASE_W12 K2APR_K6	30	60	2	1,4	T	E			S	W
2	APR011101L	Electromagnetic Compatibility			1			S2ASE_U11 K2APR_K6	15	30	1	0,7	T	Z		P	S	W
3	APR011310W	Teleinformatic networks in the technics	1					S2ASE_W13	15	30	1	0,7	T	Z			S	W
4	APR011310L	Teleinformatic networks in the technics			1			S2ASE_U12 K2APR_K6	15	30	1	0,7	T	Z		P	S	W
5	APR012119W	Programmable controllers in automation	1					S2ASE_W13	15	30	1	0,7	T	Z			S	W
6	APR012119L	Programmable controllers in automation			1			S2ASE_U12 K2APR_K6 K2APR_K7	15	30	1	0,7	T	Z		P	S	W
7	APR012213W	Power System Protection	2					S2ASE_W12	30	60	2	1,4	T	E			S	W
8	APR012213L	Power System Protection			1			S2ASE_U11 K2APR_K7	15	30	1	0,7	T	Z		P	S	W
9	APR012313W	Optimization methods in electric power industry	2					S2ASE_W14 K2APR_K1	30	60	2	1,4	T	Z			S	W
10	APR012314W	Static converters in industry	2					S2ASE_W14 K2APR_K6	30	60	2	1,4	T	Z			S	W
11	APR012315W	Static convertors - applications	2					S2ASE_W14 K2APR_K6	30	60	2	1,4	T	Z			S	W
12	APR012411W	Electrical installations of power objects	2					S2ASE_W12	30	60	2	1,4	T	E			S	W
13	APR012411C	Electrical installations of power objects		1				S2ASE_U11 K2APR_K6	15	30	1	0,7	T	Z		P	S	W
14	APR012412W	Modern electrical devices	2					S2ASE_W12	30	60	2	1,4	T	Z			S	W
15	APR012412L	Modern electrical devices			1			S2ASE_U11 K2APR_K6	15	30	1	0,7	T	Z		P	S	W
16	APR012517W	Electric energy generation	2					S2ASE_W12 K2APR_K6	30	60	2	1,4	T	E			S	W
17	APR012517C	Electric energy generation		1				S2ASE_U11 K2APR_K6	15	30	1	0,7	T	Z		P	S	W
18	APR013226W	Monitoring and diagnostic systems in industry	2					S2ASE_W12	30	60	2	1,4	T	E			S	W
19	APR013226L	Monitoring and diagnostic systems in industry			1			S2ASE_U11 K2APR_K6 K2APR_K7	15	30	1	0,7	T	Z		P	S	W
20	APR013234W	Neural Networks in Control Engineering	1					S2ASE_W13	15	30	1	0,7	T	Z			S	W
21	APR013234L	Neural Networks in Control Engineering			1			S2ASE_U12 K2APR_K6	15	30	1	0,7	T	Z		P	S	W
22	APR013235W	Fuzzy Logic Control	1					S2ASE_W13	15	30	1	0,7	T	Z			S	W
23	APR013235L	Fuzzy Logic Control			1			S2ASE_U12 K2APR_K6	15	30	1	0,7	T	Z		P	S	W
Total			5	0	2	0	0		105	210	7	4,9						

4.2.4.2. Training block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type

4.2.4.3. Diploma dissertation block

No.	Course code	Name of course	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points		Form of course	Way of crediting	Course			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes			university-wide	practical	kind	type
1	APR011159D APR012159D APR013159D	Master's thesis				12		S2ASE_U14 K2APR_K4 K2APR_K6	180	540	18	12,6	T	Z		P	S	W
2	APR012158S	Diploma seminar				2		S2ASE_U13 K2APR_K6	30	90	3	2,1	T	Z		P	S	W
Total			0	0	0	12	2		210	630	21	14,7						

Altogether for specialization blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points
lec	cl	lab	pr	sem				
5	0	2	12	2	315	840	28	19,6

4.3 Training module (Faculty Council resolution on principles of crediting training – attachment ...)

Name of training:			
Number of ECTS points	Number of ECTS points for BK classes	Training crediting mode	Code
Training duration	Training objective		

4.4. Diploma dissertation module

Type of diploma dissertation:	magister	
Number of diploma dissertation semesters	Number of ECTS points	Code
1	21	APR012158S APR011159D APR012159D APR013159D
Character of diploma dissertation		
Critical elaboration of a detailed problem related to the field of study, problem description, and analysis of a mathematical model, computer simulations and analysis, specification and design of the device and the results of research on it, and peroration of a technical documentation.		
Number of BK ECTS points:	14,7	

5. Ways of verifying assumed learning outcomes

Type of classes	Ways of verifying assumed learning outcomes
lecture	examination, progress/final test
class	progress/final test
laboratory	pretest, report from laboratory
project	project defence
seminar	participation in discussion, topic presentation, essay
diploma dissertation	prepared diploma dissertation

6. Range of diploma dissertation

7. Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular blocks

No.	Course code	Name of course	Crediting by deadline of... (number of semester)
1			
2			
3			
4			

8. Plan of studies (attachment no. 1 to description of the program of studies)

Approved by faculty student government legislative body:

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Date

.....
Name and surname, signature of student representative

.....
Date

.....
Dean's signature