DESCRIPTION OF THE PROGRAM OF STUDIES

1. Description

1.1 Number of semesters: 3	*1.2 Total number of ECTS points necessary to complete studies at a given level: 90*
1.3 Total number of hours: *1080*	*1.4 Prerequisites (particularly for second-level studies):* *Completed undergraduate or graduate degree in the field, in which contents of Electrical Engineering related to Circuit Theory and Theory of Electromagnetic Field are contained as well as knowledge gained from at least one of the courses: Electrical Drives, Electrical Devices, Fundamentals of Control Theory, High Voltage Engineering.*
1.5 Upon completion of studies graduate obtains professional degree of: *master of science, engineer*	*1.6 Graduate profile, employability:* *A graduate of English-language specialty of the second cycle of Renewable Energy Sources has an advanced and well-established knowledge of these sources of energy, including power generation, automation and control, market mechanisms and investment processes in the energy of a dispersed structure. He has the ability to apply computer tools to analyze phenomena in electrical power systems with renewable energy sources. He is capable of creative work and to make decisions and lead teams labour. He is prepared to continue his education in Doctoral School in domestic and foreign universities.*
1.7 Possibility of continuing studies: *Doctoral School*	*1.8 Indicate connection with University's mission and its development strategy:* *The knowledge gained during studies should not only lead to success in the future careers of the graduate, but also shape a creative man with a sense of entrepreneurs, open to new challenges.*

2. Detailed description:

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

W (knowledge) = 23
U (skills) = 19
K (competences) = 7
W + U + K = 49

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): 49

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:

Learning outcomes refer not only to the large sense of electrical engineering, in particular to automation and control in power systems, but - due to the demands of modern techniques and technologies currently used in power generation and industry – but also to the electronics, power electronics and microprocessor technology, computer science and management techniques and marketing. Obtaining the intended learning outcomes will enable graduates to find attractive and interesting work in the energy sector of the national economy, particularly in units where are designed and manufactured systems and control systems for the power industry. It is also ready to start a business in the electrical industry. Work on learning outcomes were refereed and discussed at the meetings of the Convention of the Faculty of Electrical Engineering, which includes, among others, representatives of industrial enterprises of the Polish territory, with particular consideration to Lower Silesia and the neighbouring provinces. The Convention also includes foreign members. At these meetings were presented and explained the needs of the labour market.

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	5
Number of ECTS points for optional subjects	0
Total number of ECTS points	5

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	17
Number of ECTS points for optional subjects	28
Total number of ECTS points	45

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:

Teachers delivering the individual courses during the first lecture present the aim and program of the respective course as well as explain the assumed teaching outcomes. Indicate a need of the self-work of student and explain how to use basic and supplementary literature for a given course. Motivate to attend regularly the classes and to use consultations.

4. List of education blocks:

4.1. List of obligatory blocks

4.1.1. List of general education blocks

4.1.1.1. 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

4.1.1.2. 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

4.1.1.3. 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

4.1.1.4. 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				
0	0	0	0	0	0	0	0	0

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	ELR051311W ELR052111W ELR052511W	Numerical methods in engineering	1					K2ETK_W2 K2ETK_K2	15	30	1	0,7	T	Z			PD	OB
2	ELR051311P ELR052111P ELR052511P	Numerical methods in engineering				1		K2ETK_U2 K2ETK_K2	15	30	1	0,7	T	Z		P	PD	OB
		Total	1	0	0	1	0		30	60	2	1,4						

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	ELR053307W	Electrical Measurement Nonelectrical Values	1					K2ETK_W5 K2ETK_K2	15	60	2	1,4	T	Z			PD	OB
2	ELR053307L	Electrical Measurement Nonelectrical Values			1			K2ETK_U4 K2ETK_K2	15	30	1	0,7	T	Z		P	PD	OB
		Total	1	0	1	0	0		30	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				
2	0	1	1	0	60	150	5	3,5

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	ELR051310W	Selected problems of circuit theory	2					K2ETK_W1	30	90	3	2,1	T	E			K	OB
2	ELR051310C	Selected problems of circuit theory		1				K2ETK_U1 K2ETK_K1	15	30	1	0,7	T	Z		P	K	OB
3	ELR052211W	Short-circuits in power systems	2					K2ETK_W3 K2ETK_K3	30	60	2	1,4	T	Z			K	OB
4	ELR053209W	Electromechanical drive systems	2					K2ETK_W4	30	90	3	2,1	T	E			K	OB
5	ELR053209L	Electromechanical drive systems			1			K2ETK_U3 K2ETK_K1	15	30	1	0,7	T	Z		P	K	OB
		Total	6	1	1	0	0		120	300	10	7						

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				
6	1	1	0	0	120	300	10	7

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	ELR051314W	Industrial ecology – selected problems	1					S2OZE_W3 K2ETK_K1 K2ETK_K3	15	30	1	0,7	T	Z			S	OB
2	ELR051315W	Photovoltaic Cells	2					S2OZE_W6 K2ETK_K6 K2ETK_K7	30	90	3	2,1	T	Z			S	OB
3	ELR051315L	Photovoltaic Cells			1			S2OZE_U4 K2ETK_K6 K2ETK_K7	15	30	1	0,7	T	Z		P	S	OB
4	ELR051316W	Measuring systems in the electrical engineering	1					S2OZE_W8	15	30	1	0,7	T	Z			S	OB
5	ELR051316L	Measuring systems in the electrical engineering			1			S2OZE_U6 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
6	ELR052117L ELR053219L	PLC application in renewable electrical power engineering systems			2			S2OZE_U5 K2ETK_K2 K2ETK_K7	30	60	2	1,4	T	Z		P	S	OB
7	ELR052118W	Modelling of DES systems	1					S2OZE_W6 S2OZE_W11	15	30	1	0,7	T	Z			S	OB
8	ELR052118L	Modelling of DES systems			1			S2OZE_U4 S2OZE_U7 K2ETK_K6 K2ETK_K7	15	30	1	0,7	T	Z		P	S	OB

9	ELR052216W	Integration of dispersed energy sources in electric power system	2					S2OZE_W4 K2ETK_K6	30	60	2	1,4	T	Z			S	OB
10	ELR052217W	Automatic control and relay protection of dispersed energy sources	1					S2OZE_W7	15	90	3	2,1	T	E			S	OB
11	ELR052217L	Automatic control and relay protection of dispersed energy sources			2			S2OZE_U3 S2OZE_U7 K2ETK_K7	30	60	2	1,4	T	Z		P	S	OB
12	ELR052314W	Energy Storage Systems	2					S2OZE_W9 K2ETK_K6	30	90	3	2,1	T	E			S	OB
13	ELR052315W	Legal regulations and investments in power system with distributed energy sources	1					S2OZE_W12 K2ETK_K6	15	30	1	0,7	T	Z			S	OB
14	ELR052315S	Legal regulations and investments in power system with distributed energy sources					1	S2OZE_U8 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
15	ELR052519W	Centralized and decentralized electricity generation technologies	2					S2OZE_W1 K2ETK_K1	30	90	3	2,1	T	E			S	OB
16	ELR052519L	Centralized and decentralized electricity generation technologies			1			S2OZE_U1 K2ETK_K1	15	30	1	0,7	T	Z		P	S	OB
17	ELR052520W	Market Mechanisms in Power Systems with Distributed Energy	2					S2OZE_W13	30	60	2	1,4	T	Z			S	OB
18	ELR052520S	Market Mechanisms in Power Systems with Distributed Energy					1	S2OZE_U8 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
19	ELR053107W	Electromechanical Systems in Renewable Energy	2					S2OZE_W5	30	60	2	1,4	T	Z			S	OB
20	ELR053107L	Electromechanical Systems in Renewable Energy			1			S2OZE_U3 K2ETK_K7	15	30	1	0,7	T	Z		P	S	OB
21	ELR053220W	Control of power electronics converters	2					S2OZE_W2 K2ETK_K6	30	60	2	1,4	T	Z			S	OB
22	ELR053259W	Power electronics converters in energetics	2					S2OZE_W10 K2ETK_K7	30	60	2	1,4	T	Z			S	OB
23	ELR053259L	Power electronics converters in energetics			1			S2OZE_U2 K2ETK_K7	15	60	2	1,4	T	Z		P	S	OB
		Total	21	0	10	0	2		495	1170	39	27,3						

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				
21	0	10	0	2	495	1170	39	27,3

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	K2ETK_U7 K2ETK_K6	15	50	2	1,4	T	Z	O	P	KO	W
2	PKH050421S	Social communication					1	K2ETK_U7 K2ETK_K6	15	50	2	1,4	T	Z	O	P	KO	W
3	PKH050521S	The art of public speaking					1	K2ETK_U7 K2ETK_K6	15	50	2	1,4	T	Z	O	P	KO	W
4	PRR051216W	Standardization and engineering law	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1	0,7	T	Z	O		KO	W
5	PRR051217W	Engineering law	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1	0,7	T	Z	O		KO	W
6	PRR051218W	Technical standardization	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1	0,7	T	Z	O		KO	W
7	ZMR052513W	Management of a Company	1					K2ETK_W6 K2ETK_K3 K2ETK_K6	15	50	2	1,4	T	Z	O		KO	W
8	ZMR052521W	Management in the power industry	1					K2ETK_W6 K2ETK_K3 K2ETK_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				K2ETK_U5 K2ETK_K1	15	30	1	0,7	T	Z	O	P	KO	W
2	JZL100710BKC	Foreign language A1 or A2		3				K2ETK_U6 K2ETK_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

4.2.2. List of basic sciences blocks

4.2.2.1. 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

4.2.2.2. 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

4.2.2.3. 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				
0	0	0	0	0	0	0	0	0

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	ELR051317W	Optimisation techniques	1					S2OZE_W14 K2ETK_K6	15	30	1	0,7	T	Z			S	W
2	ELR051317L	Optimisation techniques			1			S2OZE_U9 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
3	ELR051318W	Digital Signal Processing Algorithm for power quality	1					S2OZE_W14	15	30	1	0,7	T	Z			S	W
4	ELR051318L	Digital Signal Processing Algorithm for power quality			1			S2OZE_U9 K2ETK_K7	15	30	1	0,7	T	Z		P	S	W
5	ELR051319W	Introduction to system signal processor programming	1					S2OZE_W14 K2ETK_K6	15	30	1	0,7	T	Z			S	W
6	ELR051319L	Introduction to system signal processor programming			1			S2OZE_U9 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
7	ELR051320W	Modeling of RES systems	2					S2OZE_W16 K2ETK_K6	30	60	2	1,4	T	Z			S	W
8	ELR053108W	Electrodynamics of electrical machines and apparatus for renewable energy conversion	1					S2OZE_W15	15	60	2	1,4	T	E			S	W
9	ELR053108L	Electrodynamics of electrical machines and apparatus for renewable energy conversion			1			S2OZE_U10 K2ETK_K7	15	30	1	0,7	T	Z		P	S	W
10	ELR053109W	Modelling of electrical machines	2					S2OZE_W16 K2ETK_K1	30	60	2	1,4	T	Z			S	W
11	ELR053221W	Power electronics in industry automation	1					S2OZE_W15 K2ETK_K6	15	60	2	1,4	T	E			S	W
12	ELR053221L	Power electronics in industry automation			1			S2OZE_U10 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
13	ELR053222W	Theory of power converters	1					S2OZE_W15 K2ETK_K6	15	60	2	1,4	T	E			S	W
14	ELR053222P	Theory of power converters				1		S2OZE_U10 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
15	ELR053223W	Wind Power Station Modelling	2					S2OZE_W16 K2ETK_K6	30	60	2	1,4	T	Z			S	W
		Total	4	0	2	0	0		90	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	ELR051158S	Diploma seminar					2	S2OZE_U11 K2ETK_K6	30	90	3	2,1	T	Z		P	S	W
2	ELR051159D ELR052159D ELR053159D	Master's thesis				12		S2OZE_U12 K2ETK_K4 K2ETK_K6	180	540	18	12,6	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				
4	0	2	12	2	300	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**
		report from training	
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**	**ELR051158S** **ELR051159D** **ELR052159D** **ELR053159D**
Character of diploma dissertation		
Master's thesis has a computational, theoretical caracter, or may contain a description and analysis of the performed experimental studies. In each case it contains a section in which the author alone interpret and draw conclusions from their research. Intellectual contributions of private study should be clearly visible.		
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

The diploma examination problems are available on the Faculty website.

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 Programme of Studies)

Approved by faculty student government legislative body:

....

Date Name and surname, signature of student representative

....

Date Dean’s signature