

PROGRAMME OF STUDIES

1. Description

<i>Number of semesters: 3</i>	<i>Number ECTS points necessary to obtain qualifications: 90</i>
<i>Prerequisites:</i> <ul style="list-style-type: none"> • <i>completed undergraduate degree in Electrical Engineering at universities in Poland or abroad,</i> • <i>completed undergraduate degree in related field of study, verified by the Qualification Commission.</i> 	<i>Upon completion of studies graduate obtains professional degree of: master of science, engineer</i> <i>2nd level qualifications</i>
<i>Possibility of continuing studies: 3rd level studies (PhD)</i>	<i>Graduate profile, employability:</i> <i>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 studies of third degree (PhD) in domestic and foreign universities.</i>
<i>Indicate connection with University's mission and its development strategy:</i> <i>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.</i>	

2. Fields of science and scientific disciplines to which educational effects apply:

science field: technical sciences, science discipline: Electrical Engineering

3. Concise analysis of consistency between assumed educational effects and labour market needs:

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.

4.1.2. List of basic sciences modules

4.1.2.1. Mathematics module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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	ELR041311W ELR042111W ELR042511W	Numerical methods in engineering	1					K2ETK_W02 K2ETK_K02	15	30	1	0,7	T	Z			PD	OB
2	ELR041311P ELR042111P ELR042511P	Numerical methods in engineering				1		K2ETK_U02 K2ETK_K02	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 module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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	ELR043307W	Electrical Measurement Nonelectrical Values	1					K2ETK_W05 K2ETK_K02	15	60	2	1,4	T	Z			PD	OB
2	ELR043307L	Electrical Measurement Nonelectrical Values			1			K2ETK_U04 K2ETK_K02	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 module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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 modules

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 modules

4.1.3.1. Obligatory main-field-of-study module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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	ELR041310W	Selected problems of circuit theory	2					K2ETK_W01	30	90	3	2,1	T	E			K	OB
2	ELR041310C	Selected problems of circuit theory		1				K2ETK_U01 K2ETK_K01	15	30	1	0,7	T	Z		P	K	OB
3	ELR042211W	Short-circuits in power systems	2					K2ETK_W03 K2ETK_K03	30	60	2	1,4	T	Z			K	OB
4	ELR043209W	Electromechanical drive systems	2					K2ETK_W04	30	90	3	2,1	T	E			K	OB
5	ELR043209L	Electromechanical drive systems			1			K2ETK_U03 K2ETK_K01	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 modules

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 modules

4.1.4.1. Obligatory specialization subjects module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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	ELR041314W	Industrial ecology – selected problems	1					S2OZE_W03 K2ETK_K01 K2ETK_K03	15	30	1	0,7	T	Z			S	OB
2	ELR041315W	Photovoltaic Cells	2					S2OZE_W06 K2ETK_K06 K2ETK_K07	30	90	3	2,1	T	Z			S	OB
3	ELR041315L	Photovoltaic Cells			1			S2OZE_U04 K2ETK_K06 K2ETK_K07	15	30	1	0,7	T	Z		P	S	OB
4	ELR041316W	Measuring systems in the electrical engineering	1					S2OZE_W08	15	30	1	0,7	T	Z			S	OB
5	ELR041316L	Measuring systems in the electrical engineering			1			S2OZE_U06 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
6	ELR042117L ELR043219L	PLC application in renewable electrical power engineering systems			2			S2OZE_U05 K2ETK_K02 K2ETK_K07	30	60	2	1,4	T	Z		P	S	OB
7	ELR042118W	Modelling of DES systems	1					S2OZE_W06 S2OZE_W11	15	30	1	0,7	T	Z			S	OB
8	ELR042118L	Modelling of DES systems			1			S2OZE_U04 S2OZE_U07 K2ETK_K06 K2ETK_K07	15	30	1	0,7	T	Z		P	S	OB
9	ELR042216W	Integration of dispersed energy sources in electric power system	2					S2OZE_W04 K2ETK_K06	30	60	2	1,4	T	Z			S	OB
10	ELR042217W	Automatic control and relay protection of dispersed energy sources	1					S2OZE_W07	15	90	3	2,1	T	E			S	OB
11	ELR042217L	Automatic control and relay protection of dispersed energy sources			2			S2OZE_U03 S2OZE_U07 K2ETK_K07	30	60	2	1,4	T	Z		P	S	OB
12	ELR042314W	Energy Storage Systems	2					S2OZE_W09 K2ETK_K06	30	90	3	2,1	T	E			S	OB
13	ELR042315W	Legal regulations and investments in power system with distributed energy sources	1					S2OZE_W12 K2ETK_K06	15	30	1	0,7	T	Z			S	OB
14	ELR042315S	Legal regulations and investments in power system with distributed energy sources					1	S2OZE_U08 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
15	ELR042519W	Centralized and decentralized electricity generation technologies	2					S2OZE_W01 K2ETK_K01	30	90	3	2,1	T	E			S	OB
16	ELR042519L	Centralized and decentralized electricity generation technologies			1			S2OZE_U01 K2ETK_K01	15	30	1	0,7	T	Z		P	S	OB
17	ELR042520W	Market Mechanisms in Power Systems with Distributed Energy	2					S2OZE_W13	30	60	2	1,4	T	Z			S	OB
18	ELR042520S	Market Mechanisms in Power Systems with Distributed Energy					1	S2OZE_U08 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
19	ELR043107W	Electromechanical Systems in Renewable Energy	2					S2OZE_W05	30	60	2	1,4	T	Z			S	OB
20	ELR043107L	Electromechanical Systems in Renewable Energy			1			S2OZE_U03 K2ETK_K07	15	30	1	0,7	T	Z		P	S	OB
21	ELR043220W	Control of power electronics converters	2					S2OZE_W02 K2ETK_K06	30	60	2	1,4	T	Z			S	OB
22	ELR043259W	Power electronics converters in energetics	2					S2OZE_W10 K2ETK_K07	30	60	2	1,4	T	Z			S	OB
23	ELR043259L	Power electronics converters in energetics			1			S2OZE_U02 K2ETK_K07	15	60	2	1,4	T	Z		P	S	OB
Total			21	0	10	0	2		495	1170	39	27,3						

Altogether for specialization modules

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 modules

4.2.1. List of general education modules

4.2.1.1. Liberal-managerial subjects module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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_U07 K2ETK_K06	15	60	2	1,4	T	Z	O	P	KO	W
2	PKH050421S	Social communication					1	K2ETK_U07 K2ETK_K06	15	60	2	1,4	T	Z	O	P	KO	W
3	PKH050521S	The art of public speaking					1	K2ETK_U07 K2ETK_K06	15	60	2	1,4	T	Z	O	P	KO	W
4	PRR041216W	Standardization and engineering law	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W
5	PRR041217W	Engineering law	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W
6	PRR041218W	Technical standardization	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W
7	ZMR042513W	Management of a Company	1					K2ETK_W06 K2ETK_K03 K2ETK_K06	15	60	2	1,4	T	Z	O		KO	W
8	ZMR042521W	Management in the power industry	1					K2ETK_W06 K2ETK_K03 K2ETK_K06	15	60	2	1,4	T	Z	O		KO	W
Total			2	0	0	0	1		45	150	5	3,5						

4.2.1.2. Foreign languages module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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_U05 K2ETK_K01	15	30	1	0,7	T	Z	O	P	KO	W
2	JZL100710BKC	Foreign language A1 or A2		3				K2ETK_U06 K2ETK_K01	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 module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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 module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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 modules

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	240	8	5,6

4.2.2.1. Mathematics module

4.2.2.2. Physics module

4.2.2.3. Chemistry module

Altogether for basic sciences modules

Total number of hours					Total number of ZU hours	Total number of CNPS hours	Total number of ECTS points	Numb er 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 modules

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

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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

4.2.3.2. Training module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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

4.2.3.3. Diploma dissertation module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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	ELR041158S	Diploma seminar					2	S2OZE_U11 K2ETK_K06	30	90	3	2,1	T	Z		P	S	W
2	ELR041159D ELR042159D ELR043159D	Master's thesis					12	S2OZE_U12 K2ETK_K04 K2ETK_K06	180	540	18	12,6	T	Z		P	S	W
Total			0	0	0	12	2		210	630	21	14,7						

Altogether for main-field-of-study modules

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	12	2	210	630	21	14,7

4.2.4. List of specialization modules

4.2.4.1. Specialization subjects module

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational 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	ELR041317W	Optimisation techniques	1					S2OZE_W14 K2ETK_K06	15	30	1	0,7	T	Z			S	W
2	ELR041317L	Optimisation techniques			1			S2OZE_U09 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
3	ELR041318W	Digital Signal Processing Algorithm for power quality	1					S2OZE_W14	15	30	1	0,7	T	Z			S	W
4	ELR041318L	Digital Signal Processing Algorithm for power quality			1			S2OZE_U09 K2ETK_K07	15	30	1	0,7	T	Z		P	S	W
5	ELR041319W	Introduction to system signal processor programming	1					S2OZE_W14 K2ETK_K06	15	30	1	0,7	T	Z			S	W
6	ELR041319L	Introduction to system signal processor programming			1			S2OZE_U09 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
7	ELR041320W	Modeling of RES systems	2					S2OZE_W16 K2ETK_K06	30	60	2	1,4	T	Z			S	W
8	ELR043108W	Electrodynamics of electrical machines and apparatus for renewable energy conversion	1					S2OZE_W15	15	60	2	1,4	T	E			S	W
9	ELR043108L	Electrodynamics of electrical machines and apparatus for renewable energy conversion			1			S2OZE_U10 K2ETK_K07	15	30	1	0,7	T	Z		P	S	W
10	ELR043109W	Modelling of electrical machines	2					S2OZE_W16 K2ETK_K01	30	60	2	1,4	T	Z			S	W
11	ELR043221W	Power electronics in industry automation	1					S2OZE_W15 K2ETK_K06	15	60	2	1,4	T	E			S	W
12	ELR043221L	Power electronics in industry automation			1			S2OZE_U10 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
13	ELR043222W	Theory of power converters	1					S2OZE_W15 K2ETK_K06	15	60	2	1,4	T	E			S	W
14	ELR043222P	Theory of power converters				1		S2OZE_U10 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
15	ELR043223W	Wind Power Station Modelling	2					S2OZE_W16 K2ETK_K06	30	60	2	1,4	T	Z			S	W
Total			4		2				90	210	7	4,9						

Altogether for specialization modules

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	210	7	4,9

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	ELR041158S ELR041159D ELR042159D ELR043159D
Character of diploma dissertation		
Master's thesis has a computational, theoretical character, 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 educational effects

Type of classes	Ways of verifying assumed educational effects
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. Total number of ECTS points, which student has to obtain from classes requiring direct academic teacher-student contact (enter total of ECTS points for courses/groups of courses denoted with code BK)

63 ECTS

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

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

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

8 ECTS

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

36 ECTS

11. Range of diploma dissertation

The diploma examination problems are available on the Faculty website.

12. Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular modules

No.	Course code	Name of course	Crediting by deadline of... (number of semester)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

13. Plan of studies (attachment no.1)

Approved by faculty student government legislative body:

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Date

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

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Date

.....
Dean’s signature