

## DESCRIPTION OF THE PROGRAM OF STUDIES

Main field of study - Electrical Engineering

Profile - general academic

Level of studies - 2nd level

Form of studies - full-time

### 1. Description

<p><i>1.1 Number of semesters</i> <i>Specializations in polish: 3</i> <i>Specializations in english: 4</i></p>	<p><i>1.2 Total number of ECTS points necessary to complete studies at a given level:</i> <i>Specializations in polish: 90</i> <i>Specializations in english: 120</i></p>
<p><i>1.3 Total number of hours:</i> <i>Specializations in polish: 1080</i> <i>Specializations in english: 1440</i></p>	<p><i>1.4 Prerequisites (particularly for second-level studies):</i> <i>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.</i></p>

*1.5 Upon completion of studies graduate obtains professional degree of: master of science, engineer*

*1.6 Graduate profile, employability:*  
*A graduate of the second degree studies in the field of Industrial Electrical Engineering has advanced and well-established knowledge in the field of electrical engineering applications in production processes along with their automation. In this area, he has the ability to use IT tools for design and modeling.*  
*A graduate of the second degree studies, specializing in Electrical Power Engineering, has advanced and well-established knowledge in the field of power system operation, automation as well as protection and control techniques in the power industry. Has the ability to use IT tools for design and modeling.*  
*A graduate of the second degree studies specializing in Renewable Energy Sources has advanced and well-established knowledge in the field of these energy sources, including energy generation technologies, automation and control, as well as market mechanisms and investment processes in the energy sector with a dispersed structure. Has the ability to use IT tools to analyze phenomena in power systems with renewable energy sources.*  
*A graduate of English-language study of the second degree specializing in Control in Electrical Power Engineering has advanced and well-established knowledge in the field of techniques of control and protection of power systems. Has the ability to use IT tools to analyze phenomena in power networks and design control systems.*  
*A graduate of English-language study of the second degree specializing in Renewable Energy Systems has advanced and well-established knowledge of these energy sources, including energy generation technologies, automation and control, as well as market mechanisms and investment processes in energy with a distributed structure. Has the ability to use IT tools to analyze phenomena in power systems with renewable energy sources.*  
*A graduate of the second degree studies in the field of Electrical Engineering is capable of creative work as well as decision-making and managing employee teams. He is prepared to continue his education at the Doctoral School.*

*1.7 Possibility of continuing studies:  
Eligibility to apply for admission to a doctoral school, non-degree postgraduate programmes.*

*1.8 Indicate connection with University's mission and its development strategy:*  
*The study program for Electrical Engineering is consistent with the mission and growth strategy of the University in the field of transferring knowledge and skills to students while maintaining high quality of education, it enables the formation of creative, critical and tolerant personalities of students open to new challenges.*

## 2. Detailed description:

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

W (knowledge) = 19

U (skills) = 15

K (competences) = 7

W + U + K = 41

### 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):

### 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:

Specializations conducted in Polish: Industrial Electrical Engineering, Electrical Power Engineering, Renewable Energy Sources	82	ECTS
Specializations conducted in English: Control in Electrical Power Engineering, Renewable Energy Systems	112	ECTS

### 2.4b. For the practical profile of the main field of study - the number of ECTS points assigned to the classes shaping practical skills:

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 (now the Social Council 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 BU<sup>1</sup> code)**

Specializations conducted in Polish: Industrial Electrical Engineering, Electrical Power Engineering, Renewable Energy Sources	63	ECTS
Specializations conducted in English: Control in Electrical Power Engineering, Renewable Energy Systems	84	ECTS

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

Specializations conducted in Polish: Industrial Electrical Engineering, Electrical Power Engineering, Renewable Energy Sources

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

Specializations conducted in English: Control in Electrical Power Engineering, Renewable Energy Systems

Number of ECTS points for obligatory subjects	7
Number of ECTS points for optional subjects	0
Total number of ECTS points	7

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

Specializations conducted in Polish: Industrial Electrical Engineering

Number of ECTS points for obligatory subjects	19
Number of ECTS points for optional subjects	27
Total number of ECTS points	46

Specializations conducted in Polish: Electrical Power Engineering

Number of ECTS points for obligatory subjects	21
Number of ECTS points for optional subjects	28
Total number of ECTS points	49

Specializations conducted in Polish: Renewable Energy Sources

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

Specializations conducted in English: Control in Electrical Power Engineering

Number of ECTS points for obligatory subjects	26
Number of ECTS points for optional subjects	40
Total number of ECTS points	66

Specializations conducted in English: Renewable Energy Systems

Number of ECTS points for obligatory subjects	27
Number of ECTS points for optional subjects	40
Total number of ECTS points	67

**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)**

Specializations conducted in Polish: Industrial Electrical Engineering, Electrical Power Engineering, Renewable Energy Sources	36	ECTS
Specializations conducted in English: Control in Electrical Power Engineering, Renewable Energy Systems	48	ECTS

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

*The process leading to the planned learning outcomes in the field of Electrical Engineering is multi-stage and compliant with the Education Quality Assurance System in force at the Faculty of Electrical Engineering. In the recruitment process, the aim is to accept candidates for second-cycle studies with the highest possible recruitment rates. During the first meetings, academic teachers conducting classes familiarize students with the prerequisites for a given subject, the assumed learning outcomes and the program of classes. The lecturers should also indicate the need for students' own systematic work and motivate them to think independently and draw conclusions. Achieving learning outcomes at the second degree of studies enables the acquisition of advanced knowledge in specialist subjects, characteristic of the chosen field of study and specialization. Academic teachers are available to students outside of scheduled classes during designated consultation hours. In order to gain access to the literature recommended by the teachers, students can use the resources of the Faculty Library and the Main Library of Wrocław University of Science and Technology. The classrooms in which the classes are held are equipped with modern audiovisual systems and appropriate measuring and research devices that enable students to acquire knowledge and acquire specialist skills. Second-cycle studies end with a diploma examination, which can be taken by a student who has completed the study program and obtained a positive grade in the diploma dissertation.*



#### 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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University wide	Concerning scientific activities	Practical	Type
1	W05ETK-SM1330W	Numerical and Optimization Methods	1					K2ETK_W2	15	60	2	2	1,4	T-Z	Z		DN		PD
2	W05ETK-SM1330L	Numerical and Optimization Methods			1			K2ETK_U2 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	PD
Total			1	0	1	0	0		30	90	3	3	2,1						

##### 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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University wide	Concerning scientific activities	Practical	Type
1	W05ETK-SM3312W	Measurement methods and techniques	2					K2ETK_W5 K2ETK_K7	30	60	2	2	1,4	T-Z	Z		DN		PD
2	W05ETK-SM3312L	Measurement methods and techniques			2			K2ETK_U4 K2ETK_K7	30	60	2	2	1,4	T	Z		DN	P	PD
Total			2	0	2	0	0		60	120	4	4	2,8						

##### 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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University wide	Concerning scientific activities	Practical	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 for DN classes	Number of ECTS points for BU classes
lec	cl	lab	pr	sem					
3	0	3	0	0	90	210	7	7	4,9

**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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University-wide	Concerning scientific activities	Practical	Type
1	W05ETK-SM1332W	Circuits and Systems	2					K2ETK_W1	30	90	3	3	2,1	T-Z	E		DN		K
2	W05ETK-SM1332C	Circuits and Systems		1				K2ETK_U1 K2ETK_K1	15	30	1	1	0,7	T	Z		DN	P	K
3	W05ETK-SM2131W	Power Systems Faults	2					K2ETK_W3 K2ETK_K1	30	120	4	4	2,8	T-Z	E		DN		K
4	W05ETK-SM3225W	Dynamics and Control of AC and DC Drives	2					K2ETK_W4	30	120	4	4	2,8	T-Z	E		DN		K
5	W05ETK-SM3225L	Dynamics and Control of AC and DC Drives			1			K2ETK_U3 K2ETK_K2 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	K
6	W05ETK-SM3225P	Dynamics and Control of AC and DC Drives				1		K2ETK_U3 K2ETK_K2 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	K
<b>Total</b>			<b>6</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>		<b>135</b>	<b>420</b>	<b>14</b>	<b>14</b>	<b>9,8</b>						

**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 for DN classes	Number of ECTS points for BU classes
lec	cl	lab	pr	sem					
6	1	1	1	0	135	420	14	14	9,8



**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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University-wide	Concerning scientific activities	Practical	Type
1	W05ETK-SM1331W	Power Quality Assessment	2					K2ETK_W12 K2ETK_K1 K2ETK_K2	30	90	3	3	2,1	T-Z	Z		DN		S
2	W05ETK-SM1331L	Power Quality Assessment			1			K2ETK_U11 K2ETK_K1 K2ETK_K2	15	30	1	1	0,7	T	Z		DN	P	S
3	W05ETK-SM1337W	Photovoltaic Cells	2					K2ETK_W13 K2ETK_K6	30	60	2	2	1,4	T-Z	E		DN		S
4	W05ETK-SM1337L	Photovoltaic Cells			1			K2ETK_U8 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
5	W05ETK-SM1338W	Industrial ecology - selected problems	1					K2ETK_W11 K2ETK_K3	15	30	1	1	0,7	T-Z	Z		DN		S
6	W05ETK-SM1338S	Industrial ecology - selected problems					1	K2ETK_U9 K2ETK_K3	15	30	1	1	0,7	T	Z		DN	P	S
7	W05ETK-SM2133W	Simulation and Analysis of Power System Transients	1					K2ETK_W10	15	30	1	1	0,7	T-Z	Z		DN		S
8	W05ETK-SM2133L	Simulation and Analysis of Power System Transients			2			K2ETK_U10 K2ETK_K6 K2ETK_K7	30	60	2	2	1,4	T	Z		DN	P	S
9	W05ETK-SM2135W	Artificial Intelligence Techniques	2					K2ETK_W9	30	60	2	2	1,4	T-Z	Z		DN		S
10	W05ETK-SM2135P	Artificial Intelligence Techniques				1		K2ETK_U8 K2ETK_K2	15	30	1	1	0,7	T	Z		DN	P	S
11	W05ETK-SM2137W	Protection and Control of Distributed Energy Sources 1	1					K2ETK_W9	15	60	2	2	1,4	T-Z	Z		DN		S
12	W05ETK-SM2137L	Protection and Control of Distributed Energy Sources 1			1			K2ETK_U9 K2ETK_K1 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
13	W05ETK-SM2139P	Fault Calculations				2		K2ETK_U9 K2ETK_K2	30	60	2	2	1,4	T	Z		DN	P	S
14	W05ETK-SM2141S	Protection and Control of Distributed Energy Sources 2					1	K2ETK_U13	15	30	1	1	0,7	T-Z	Z		DN	P	S
15	W05ETK-SM2331W	Renewable Energy Sources	2					K2ETK_W8 K2ETK_K6	30	60	2	2	1,4	T-Z	E		DN		S
16	W05ETK-SM2331S	Renewable Energy Sources					1	K2ETK_U9 K2ETK_K6	15	30	1	1	0,7	T-Z	Z		DN	P	S
17	W05ETK-SM2332W	Water Power Plants 1	2					K2ETK_W8	30	60	2	2	1,4	T-Z	Z		DN		S
18	W05ETK-SM2334W	Energy Storage Systems	1					K2ETK_W12	15	60	2	2	1,4	T-Z	E		DN		S
19	W05ETK-SM2334P	Energy Storage Systems				1		K2ETK_U8 K2ETK_K7	15	30	1	1	0,7	T	Z		DN	P	S
20	W05ETK-SM2336S	Water Power Plants 2					1	K2ETK_U9 K2ETK_K7	15	30	1	1	0,7	T-Z	Z		DN	P	S
21	W05ETK-SM2536W	Integration of Distributed Resources in Power Systems	2					K2ETK_W10 K2ETK_K6	30	60	2	2	1,4	T-Z	E		DN		S
22	W05ETK-SM2536L	Integration of Distributed Resources in Power Systems			1			K2ETK_U9 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
23	W05ETK-SM2537W	Legal Regulations and Investments in Power Systems with Distributed Energy Sources	2					K2ETK_W17 K2ETK_K6	30	60	2	2	1,4	T-Z	Z		DN		S
24	W05ETK-SM2537S	Legal Regulations and Investments in Power Systems with Distributed Energy Sources					1	K2ETK_U9 K2ETK_K6	15	30	1	1	0,7	T-Z	Z		DN	P	S

25	W05ETK-SM3110W	Modelling of Electrical Machines	1						K2ETK_W9	15	30	1	1	0,7	T-Z	Z		DN		S
26	W05ETK-SM3110P	Modelling of Electrical Machines				2			K2ETK_U11 K2ETK_K6	30	60	2	2	1,4	T	Z		DN	P	S
27	W05ETK-SM3228W	Power Electronics	2						K2ETK_W14 K2ETK_K7	30	60	2	2	1,4	T-Z	Z		DN		S
28	W05ETK-SM3228L	Power Electronics			1				K2ETK_U8 K2ETK_K7	15	30	1	1	0,7	T	Z		DN	P	S
29	W05ETK-SM3229W	Electromechanical Systems in Renewable Energy	1						K2ETK_W14	15	30	1	1	0,7	T-Z	Z		DN		S
30	W05ETK-SM3229S	Electromechanical Systems in Renewable Energy					1		K2ETK_U9 K2ETK_K1	15	30	1	1	0,7	T-Z	Z		DN	P	S
31	W05ETK-SM3311W	Electromagnetic Compatibility	2						K2ETK_W11 K2ETK_K7	30	60	2	2	1,4	T-Z	Z		DN		S
32	W05ETK-SM3311L	Electromagnetic Compatibility			1				K2ETK_U11 K2ETK_K7	15	30	1	1	0,7	T	Z		DN	P	S
33	W09ETK-SM1501W	Advanced Technology in Electrical Power Generation	2						K2ETK_W19	30	90	3	3	2,1	T-Z	Z		DN		S
34	W09ETK-SM1501C	Advanced Technology in Electrical Power Generation		1					K2ETK_U9 K2ETK_K3	15	30	1	1	0,7	T	Z		DN	P	S
<b>Total</b>			<b>26</b>	<b>1</b>	<b>8</b>	<b>6</b>	<b>6</b>			<b>705</b>	<b>1530</b>	<b>51</b>	<b>51</b>	<b>35,7</b>						

#### 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 for DN classes	Number of ECTS points for BU classes
lec	cl	lab	pr	sem					
26	1	8	6	6	705	1530	51	51	35,7

## 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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University-wide	Concerning scientific activities	Practical	Type
1	W08ETK-SM1721S	Ethics in bussiness					1	K2ETK_U7 K2ETK_K6	15	50	2		1,4	T-Z	Z	O	-	P	KO
2	W08ETK-SM3721S	The art of public speaking					1	K2ETK_U7 K2ETK_K6	15	50	2		1,4	T-Z	Z	O	-	P	KO
3	W08ETK-SM3821S	Social communication					1	K2ETK_U7 K2ETK_K6	15	50	2		1,4	T-Z	Z	O	-	P	KO
4	W05ETK-SM1231W	Intellectual property rights in the world	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1		0,7	T-Z	Z	O	-		KO
5	W05ETK-SM1232W	Inventions and patents	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1		0,7	T-Z	Z	O	-		KO
6	W05ETK-SM1233W	Industrial property and copyright for engineers	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1		0,7	T-Z	Z	O	-		KO
7	W05ETK-SM1007W	Protection of Intellectual Property	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1		0,7	T-Z	Z	O	-		KO
8	W05ETK-SM1008W	International Law	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1		0,7	T-Z	Z	O	-		KO
9	W05ETK-SM2538W	Market Mechanisms in Power Systems with Distributed Energy Sources	1					K2ETK_W6 K2ETK_K3 K2ETK_K6	15	50	2		1,4	T-Z	Z	O	-		KO
10	W05ETK-SM1499W	Fundamentals of Management	1					K2ETK_W6 K2ETK_K3 K2ETK_K6	15	50	2		1,4	T-Z	Z	O	-		KO
<b>Total</b>			<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>		<b>45</b>	<b>125</b>	<b>5</b>	<b>0</b>	<b>3,5</b>						

#### 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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University wide	Concerning scientific activities	Practical	Type
1	SJO000-SM00	Foreign language B2+ or C1+		1				K2ETK_U5 K2ETK_K1	15	30	1		0,7	T	Z	O	-	P	KO
2	SJO000-SM00	Foreign language A1 or A2		3				K2ETK_U6 K2ETK_K1	45	60	2		1,4	T	Z	O	-	P	KO
<b>Total</b>			0	4	0	0	0		60	90	3	0	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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University wide	Concerning scientific activities	Practical	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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University wide	Concerning scientific activities	Practical	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 for DN classes	Number of ECTS points for BU classes
lec	cl	lab	pr	sem					
2	4	0	0	1	105	215	8	0	5,6



**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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University-wide	Concerning scientific activities	Practical	Type
1	W05ETK-SM1230W	Visual Engineering Environments and Graphical Languages	1					K2ETK_W16	15	30	1	1	0,7	T-Z	E		DN		S
2	W05ETK-SM1230L	Visual Engineering Environments and Graphical Languages			2			K2ETK_U13 K2ETK_K2	30	90	3	3	2,1	T	Z		DN	P	S
3	W05ETK-SM1334W	Signal and Systems	2					K2ETK_W16	30	90	3	3	2,1	T-Z	E		DN		S
4	W05ETK-SM1334C	Signal and Systems		1				K2ETK_U13 K2ETK_K1	15	30	1	1	0,7	T	Z		DN	P	S
5	W05ETK-SM1335W	Advanced Signal Processing Methods	2					K2ETK_W16	30	90	3	3	2,1	T-Z	E		DN		S
6	W05ETK-SM1335C	Advanced Signal Processing Methods		1				K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
7	W05ETK-SM2136W	Design of logic circuits	1					K2ETK_W14	15	60	2	2	1,4	T-Z	Z		DN		S
8	W05ETK-SM2136L	Design of logic circuits			1			K2ETK_U13 K2ETK_K1 K2ETK_K2 K2ETK_K7	15	30	1	1	0,7	T	Z		DN	P	S
9	W05ETK-SM2138W	Electrical Power Engineering – excursionary activities	1					K2ETK_W14 K2ETK_K6	15	60	2	2	1,4	T-Z	Z		DN		S
10	W05ETK-SM2138S	Electrical Power Engineering – excursionary activities					1	K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T-Z	Z		DN	P	S
11	W05ETK-SM2234W	PLC and Wireless Communications for Monitoring and Metering	2					K2ETK_W16 K2ETK_K6	30	90	3	3	2,1	T-Z	E		DN		S
12	W05ETK-SM2234S	PLC and Wireless Communications for Monitoring and Metering					1	K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T-Z	Z		DN	P	S
13	W05ETK-SM2335W	Advanced Substations and Electrical Equipment	2					K2ETK_W16	30	90	3	3	2,1	T-Z	E		DN		S
14	W05ETK-SM2335P	Advanced Substations and Electrical Equipment				1		K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
15	W05ETK-SM2534W	Power System Modelling	2					K2ETK_W16	30	90	3	3	2,1	T-Z	E		DN		S
16	W05ETK-SM2534P	Power System Modelling				1		K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
17	W05ETK-SM2535W	Computer Control of Power System	2					K2ETK_W16	30	90	3	3	2,1	T-Z	E		DN		S
18	W05ETK-SM2535S	Computer Control of Power System					1	K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T-Z	Z		DN	P	S
19	W05ETK-SM3226W	Fuzzy Logic Control	1					K2ETK_W14	15	60	2	2	1,4	T-Z	Z		DN		S
20	W05ETK-SM3226L	Fuzzy Logic Control			1			K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
21	W05ETK-SM3227W	Control of Power Electronic Converters	1					K2ETK_W14 K2ETK_K6	15	60	2	2	1,4	T-Z	Z		DN		S
22	W05ETK-SM3227L	Control of Power Electronic Converters			1			K2ETK_U13 K2ETK_K6	15	30	1	1	0,7	T	Z		DN	P	S
Total			3	1	1	0	0		75	210	7	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/group of courses	Way of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	DN classes	BU classes			University-wide	Concerning scientific activities	Practical	Type
1	W05ETK-SM5105Q	Diploma placement 4 weeks				40		K2ETK_U12 K2ETK_K6	160	120	4	4	2,8	T	Z		DN	P	S
Total			0	0	0	40	0		160	120	4	4	2,8						

#### 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	DN classes	BU classes			university-wide	zw. z dzial. nauk.	practical	kind
1	W05ETK-SM5108S	Diploma seminar					2	K2ETK_U14 K2ETK_K6	30	90	3	3	2,1	T-Z	Z		DN	P	S
2	W05ETK-SM5117P	Diploma Project				8		K2ETK_U15 K2ETK_K6	120	240	8	8	5,6	T	Z		DN	P	S
3	W05ETK-SM5119D	Master's thesis				12		K2ETK_U15 K2ETK_K4 K2ETK_K6	180	540	18	18	12,6	T	Z		DN	P	S
4	W05ETK-SM5127P	Diploma Project				8		K2ETK_U15 K2ETK_K6	120	240	8	8	5,6	T	Z		DN	P	S
5	W05ETK-SM5129D	Master's thesis				12		K2ETK_U15 K2ETK_K4 K2ETK_K6	180	540	18	18	12,6	T	Z		DN	P	S
6	W05ETK-SM5137P	Diploma Project				8		K2ETK_U15 K2ETK_K6	120	240	8	8	5,6	T	Z		DN	P	S
7	W05ETK-SM5139D	Master's thesis				12		K2ETK_U15 K2ETK_K4 K2ETK_K6	180	540	18	18	12,6	T	Z		DN	P	S
Total			0	0	0	20	2		330	870	29	29	20,3						

#### 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 for DN classes	Number of ECTS points for BU classes
lec	cl	lab	pr	sem					
3	1	1	60	2	565	1200	40	40	28

### 4.3 Training block - concerning principles of training crediting – attachment no. 2

Name of training:	Diploma placement 4 weeks		
Number of ECTS points	Number of ECTS points for BU classes	Training crediting mode	Code
4	2,8	report from training	W05ETK-SM5105Q
Training duration	Training objective		
4 weeks	<p>"The primary objective is to confront the theoretical knowledge acquired in the course included in the learning schedule, with the real demands of the employers. During practice the student gains industrial experience, take note of the basic technical equipment and technology of the companies, learns the specificity of work of the higher technical inspection facility, in particular:</p> <ul style="list-style-type: none"> <li>• extends the knowledge gained during studies and develops the skills to use it,</li> <li>• familiarize themselves with the specific of professional environment,</li> <li>• shapes specific professional skills directly related to the place of practice,</li> <li>• shapes the skills of effective communication in an organization,</li> <li>• learns the functioning in an organizational structure, the principles of the organization of work and the division of powers, procedures, work planning, control,</li> <li>• improves the ability of self organization, teamwork, effective time management, diligence, responsibility for assigned tasks,</li> <li>• improves the ability to use a foreign language in professional contexts.</li> </ul> <p>By free choice of the place of practice, ie by their own choice of the ""Company"" or the choice of units and facilities from the faculty list, students can pursue their professional interests. There is a possibility of some connection with the subject of the future practice of Master thesis. The practice allows you to focus the student's preferences with regard to the future work."</p>		

### 4.4. Diploma dissertation block

Type of diploma dissertation:	magister	
Number of diploma dissertation semesters	Number of ECTS points	Code
1	29	W05ETK-SM5108S W05ETK-SM5117P W05ETK-SM5127P W05ETK-SM5137P W05ETK-SM5119D W05ETK-SM5129D W05ETK-SM5139D
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 BU ECTS points: 20,3  
 Number of DN ECTS points: 29

## 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
training	report from training
diploma dissertation	prepared diploma dissertation

## 6. Range of diploma dissertation

The diploma examination consists of the presentation of the diploma thesis and answers to randomly selected questions. The scope of the diploma examination includes questions on the following issues, according to the chosen specialization.

Renewable Energy Systems:

1. Numerical and optimisation methods
2. Power system faults
3. Dynamics and control of AC/DC drives
4. Circuits and systems
5. Measurement methods and techniques
6. Power quality assessment
7. Power electronics
8. Advanced technology in electrical power generation
9. Protection and control of distributed energy sources
10. Water power plants
11. Renewable energy sources
12. Integration of distributed resources in power systems
13. Electromechanical systems in renewable energy
14. Simulation and analysis of power system transients
15. Photovoltaic cells
16. Electromagnetic compatibility
17. Energy storage systems
18. Artificial intelligence techniques



### 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. ...)

Approved by faculty student government legislative body:

.....

Date

.....

Name and surname, signature of student representative

.....

Date

.....

Dean's signature

BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

Traditional – enter T, remote – enter Z

Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

University-wide course /group of courses – enter O

DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses