Zał. nr 3 do ZW 64/2012
Attachment no.1 to Programme of Studies

PLAN OF STUDIES

FACULTY: Electrical Engineering

MAIN FIELD OF STUDY: Electrical Engineering

EDUCATION LEVEL: 2nd level, 2nd level studies

FORM OF STUDIES: full-time

PROFILE: general academic

SPECIALIZATION: Renewable Energy Systems

LANGUAGE OF STUDY: english

Electrical Engineering Faculty Council Resolution of 10.07.2017 r.
In effect since 01.10.2017 r.

1. Set of obligatory and optional courses and groups of courses in semestral arrangement

Semester 1

Obligatory courses **number of ECTS points: 27**

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	ELR041330W	Numerical and Optimization Methods	1					K2ETK_W02	15	60	2	1,4	T	Z			PD	OB
2	ELR041330L	Numerical and Optimization Methods			1			K2ETK_U02 K2ETK_K06	15	30	1	0,7	T	Z		P	PD	OB
3	ELR041331W	Power Quality Assessment	2					S2RES_W13 K2ETK_K01 K2ETK_K02	30	90	3	2,1	T	Z			S	OB
4	ELR041331L	Power Quality Assessment			1			S2RES_U13 K2ETK_K01 K2ETK_K02	15	30	1	0,7	T	Z		P	S	OB
5	ELR041332W	Circuits and Systems	2					K2ETK_W01	30	90	3	2,1	T	E			K	OB
6	ELR041332C	Circuits and Systems		1				K2ETK_U01 K2ETK_K01	15	30	1	0,7	T	Z		P	K	OB
7	ELR042131W	Power Systems Faults	2					K2ETK_W03 K2ETK_K01	30	120	4	2,8	T	E			K	OB
8	ELR042139P	Fault Calculations				2		S2RES_U14 K2ETK_K02	30	60	2	1,4	T	Z		P	S	OB
9	ELR043225W	Dynamics and Control of AC and DC Drives	2					K2ETK_W04	30	120	4	2,8	T	E			K	OB
10	ELR043225L	Dynamics and Control of AC and DC Drives			1			K2ETK_U03 K2ETK_K02 K2ETK_K06	15	30	1	0,7	T	Z		P	K	OB
11	ELR043225P	Dynamics and Control of AC and DC Drives				1		K2ETK_U03 K2ETK_K02 K2ETK_K06	15	30	1	0,7	T	Z		P	K	OB
12	ESN001501W	Advanced Technology in Electrical Power Generation	2					S2RES_W14	30	90	3	2,1	T	Z			S	OB
13	ESN001501C	Advanced Technology in Electrical Power Generation		1				S2RES_U15 K2ETK_K03	15	30	1	0,7	T	Z		P	S	OB
		Total	11	2	3	3			285	810	27	18,9						

Optional courses **minimum** **60** **hours in semester,** **3** **ECTS points**

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
Optional courses block: Foreign Language										**ECTS**		**3**	**hours**		**4**			
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

Altogether in semester

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				
11	6	3	3	0	345	900	30	21

Semester 2

Obligatory courses **number of ECTS points: 24**

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	ELR042133W	Simulation and Analysis of Power System Transients	1					S2RES_W15	15	30	1	0,7	T	Z			S	OB
2	ELR042133L	Simulation and Analysis of Power System Transients			2			S2RES_U16 K2ETK_K06 K2ETK_K07	30	60	2	1,4	T	Z		P	S	OB
3	ELR042137W	Protection and Control of Distributed Energy Sources	1					S2RES_W02	15	60	2	1,4	T	E			S	OB
4	ELR042137L	Protection and Control of Distributed Energy Sources			1			S2RES_U02 K2ETK_K01 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
5	ELR042137S	Protection and Control of Distributed Energy Sources					1	S2RES_U07	15	30	1	0,7	T	Z		P	S	OB
6	ELR042331W	Renewable Energy Sources	2					S2RES_W05 K2ETK_K06	30	60	2	1,4	T	Z			S	OB
7	ELR042331S	Renewable Energy Sources					1	S2RES_U05 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
8	ELR042332W	Water Power Plants	2					S2RES_W04	30	60	2	1,4	T	Z			S	OB
9	ELR042332S	Water Power Plants					1	S2RES_U04 K2ETK_K07	15	30	1	0,7	T	Z		P	S	OB
10	ELR042536W	Integration of Distributed Resources in Power Systems	2					S2RES_W06 K2ETK_K06	30	60	2	1,4	T	E			S	OB
11	ELR042536L	Integration of Distributed Resources in Power Systems			1			S2RES_U06 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
12	ELR043110W	Modelling of Electrical Machines	1					S2RES_W10	15	30	1	0,7	T	Z			S	OB
13	ELR043110P	Modelling of Electrical Machines				2		S2RES_U10 K2ETK_K06	30	60	2	1,4	T	Z		P	S	OB
14	ELR043228W	Power Electronics	2					S2RES_W01 K2ETK_K07	30	60	2	1,4	T	Z			S	OB
15	ELR043228L	Power Electronics			1			S2RES_U01 K2ETK_K07	15	30	1	0,7	T	Z		P	S	OB
16	ELR043229W	Electromechanical Systems in Renewable Energy	1					S2RES_W07	15	30	1	0,7	T	Z			S	OB
17	ELR043229S	Electromechanical Systems in Renewable Energy					1	S2RES_U17 K2ETK_K01	15	30	1	0,7	T	Z		P	S	OB
		Total	12		5	2	4		345	720	24	16,8						

Optional courses **minimum** **175** **hours in semester,** **6** **ECTS points**

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	ELR045105Q	Diploma placement 4 weeks				40		S2RES_U21 K2ETK_K06	160	120	4	2,8	T	Z		P	S	W
Optional courses block: Management										**ECTS**		**2**	**hours**		**1**			
1	ZMR042538W	Market Mechanisms in Power Systems with Distributed Energy	1					K2ETK_W06 K2ETK_K03 K2ETK_K06	15	60	2	1,4	T	Z	O		KO	W
2	ZMZ001499W	Fundamentals of Management	1					K2ETK_W06 K2ETK_K03 K2ETK_K06	15	60	2	1,4	T	Z	O		KO	W

Altogether in semester

	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				
	13	0	5	2	4	360	780	26	18,2
Diploma placement 4 weeks	0	0	0	40	0	160	120	4	2,8

Semester 3

Obligatory courses **number of ECTS points: 21**

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	ELR041337W	Photovoltaic Cells	2					S2RES_W08 K2ETK_K06	30	60	2	1,4	T	E			S	OB
2	ELR041337L	Photovoltaic Cells			1			S2RES_U08 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
3	ELR041338W	Industrial ecology - selected problems	1					S2RES_W09 K2ETK_K03	15	30	1	0,7	T	Z			S	OB
4	ELR041338S	Industrial ecology - selected problems					1	S2RES_U09 K2ETK_K03	15	30	1	0,7	T	Z		P	S	OB
5	ELR042135W	Artificial Intelligence Techniques	2					S2RES_W16	30	60	2	1,4	T	Z			S	OB
6	ELR042135P	Artificial Intelligence Techniques				1		S2RES_U18 K2ETK_K02	15	30	1	0,7	T	Z		P	S	OB
7	ELR042334W	Energy Storage Systems	1					S2RES_W03	15	60	2	1,4	T	E			S	OB
8	ELR042334P	Energy Storage Systems				1		S2RES_U03 K2ETK_K07	15	30	1	0,7	T	Z		P	S	OB
9	ELR042537W	Legal Regulations and Investments in Power Systems with Distributed Energy Sources	2					S2RES_W12 K2ETK_K06	30	60	2	1,4	T	Z			S	OB
10	ELR042537S	Legal Regulations and Investments in Power Systems with Distributed Energy Sources					1	S2RES_U12 K2ETK_K06	15	30	1	0,7	T	Z		P	S	OB
11	ELR043311W	Electromagnetic Compatibility	2					S2RES_W11 K2ETK_K07	30	60	2	1,4	T	Z			S	OB
12	ELR043311L	Electromagnetic Compatibility			1			S2RES_U11 K2ETK_K07	15	30	1	0,7	T	Z		P	S	OB
13	ELR043312W	Measurement methods and techniques	2					K2ETK_W05 K2ETK_K07	30	60	2	1,4	T	Z			PD	OB
14	ELR043312L	Measurement methods and techniques			2			K2ETK_U04 K2ETK_K07	30	60	2	1,4	T	Z		P	PD	OB
		Total	12		4	2	2		300	630	21	14,7						

Optional courses **minimum** **135** **hours in semester,** **9** **ECTS points**

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	ELR045117P ELR045127P ELR045137P	Diploma Project				8		S2RES_U22 K2ETK_K06	120	240	8	5,6	T	Z		P	S	W
Optional courses block: Law										**ECTS**		**1**	**hours**		**1**			
1	PRR041231W	Intellectual property rights in the world	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W
2	PRR041232W	Inventions and patents	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W
3	PRR041233W	Industrial property and copyright for engineers	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W
4	PRZ001007W	Protection of Intellectual Property	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W
5	PRZ001008W	International Law	1					K2ETK_W07 K2ETK_K03 K2ETK_K05	15	30	1	0,7	T	Z	O		KO	W

Altogether in semester

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				
13	0	4	10	2	435	900	30	21

Semester 4

Optional courses **minimum** **300** **hours in semester,** **30** **ECTS points**

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	ELR045108S	Diploma seminar					2	S2RES_U23 K2ETK_K06	30	90	3	2,1	T	Z		P	S	W
2	ELR045119DP ELR045129DP ELR045139DP	Master's thesis				12		S2RES_U24 K2ETK_K04 K2ETK_K06	180	540	18	12,6	T	Z		P	S	W
Optional courses block: Social Sciences and Ethics										**ECTS**		**2**	**hours**		**1**			
1	FLH051721S	Ethics in bussiness					1	K2ETK_U07 K2ETK_K06	15	60	2	1,4	T	Z	O	P	KO	W
2	PKH053721S	The art of public speaking					1	K2ETK_U07 K2ETK_K06	15	60	2	1,4	T	Z	O	P	KO	W
3	PKH053821S	Social communication					1	K2ETK_U07 K2ETK_K06	15	60	2	1,4	T	Z	O	P	KO	W
Optional courses block: A										**ECTS**		**4**	**hours**		**3**			
1	ELR041230W	Visual Engineering Environments and Graphical Languages	1					S2RES_W17	15	30	1	0,7	T	E			S	W
2	ELR041230L	Visual Engineering Environments and Graphical Languages			2			S2RES_U19 K2ETK_K02	30	90	3	2,1	T	Z		P	S	W
3	ELR041334W	Signal and Systems	2					S2RES_W17	30	90	3	2,1	T	E			S	W
4	ELR041334C	Signal and Systems		1				S2RES_U19 K2ETK_K01	15	30	1	0,7	T	Z		P	S	W
5	ELR041335W	Advanced Signal Processing Methods	2					S2RES_W17	30	90	3	2,1	T	E			S	W
6	ELR041335C	Advanced Signal Processing Methods		1				S2RES_U19 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
7	ELR042234W	PLC and Wireless Communications for Monitoring and Metering	2					S2RES_W17 K2ETK_K06	30	90	3	2,1	T	E			S	W
8	ELR042234S	PLC and Wireless Communications for Monitoring and Metering					1	S2RES_U19 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
9	ELR042335W	Advanced Substations and Electrical Equipment	2					S2RES_W17	30	90	3	2,1	T	E			S	W
10	ELR042335P	Advanced Substations and Electrical Equipment				1		S2RES_U19 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
11	ELR042534W	Power System Modelling	2					S2RES_W17	30	90	3	2,1	T	E			S	W
12	ELR042534P	Power System Modelling				1		S2RES_U19 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
13	ELR042535W	Computer Control of Power System	2					S2RES_W17	30	90	3	2,1	T	E			S	W
14	ELR042535S	Computer Control of Power System					1	S2RES_U19 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
Optional courses block: B										**ECTS**		**3**	**hours**		**2**			
1	ELR042136W	Design of logic circuits	1					S2RES_W18	15	60	2	1,4	T	Z			S	W
2	ELR042136L	Design of logic circuits			1			S2RES_U20 K2ETK_K01 K2ETK_K02 K2ETK_K07	15	30	1	0,7	T	Z		P	S	W
3	ELR042138W	Electrical Power Engineering – excursionary activities	1						15	60	2	1,4	T	Z			S	W
4	ELR042138S	Electrical Power Engineering – excursionary activities					1		15	30	1	0,7	T	Z		P	S	W
5	ELR043226W	Fuzzy Logic Control	1					S2RES_W18	15	60	2	1,4	T	Z			S	W
6	ELR043226L	Fuzzy Logic Control			1			S2RES_U20 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W
7	ELR043227W	Control of Power Electronic Converters	1					S2RES_W18 K2ETK_K06	15	60	2	1,4	T	Z			S	W
8	ELR043227L	Control of Power Electronic Converters			1			S2RES_U20 K2ETK_K06	15	30	1	0,7	T	Z		P	S	W

Altogether in semester

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	1	1	12	3	300	900	30	21

2. Set of examinations in semestral arrangement

Course code	Names of courses ending with examination	Semester
ELR041332W	Circuits and Systems	1
ELR042131W	Power Systems Faults	1
ELR043225W	Dynamics and Control of AC and DC Drives	1
ELR042137W	Protection and Control of Distributed Energy Sources	2
ELR042536W	Integration of Distributed Resources in Power Systems	2
ELR041337W	Photovoltaic Cells	3
ELR042334W	Energy Storage Systems	3
one exam from optional courses block A		4

3. Numbers of allowable deficit of ECTS points after particular semesters

Semester	Allowable deficit of ECTS points after semester
1	4
2	4
3	4
4	0

Opinion of student government legislative body

....
Date

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

....
Date

....
Dean's signature