

## PLAN OF STUDIES

<b>FACULTY:</b>	Electrical Engineering
<b>MAIN FIELD OF STUDY:</b>	Electrical Engineering
<b>EDUCATION LEVEL:</b>	2nd level, 2nd level studies
<b>FORM OF STUDIES:</b>	full-time
<b>PROFILE:</b>	general academic
<b>SPECIALIZATION:</b>	Renewable Energy Systems
<b>LANGUAGE OF STUDY:</b>	english

# 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					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	ELR051330W	Numerical and Optimization Methods	1					K2ETK_W2	15	60	2	1,4	T	Z			PD	OB
2	ELR051330L	Numerical and Optimization Methods			1			K2ETK_U2 K2ETK_K6	15	30	1	0,7	T	Z		P	PD	OB
3	ELR051331W	Power Quality Assessment	2					S2RES_W13 K2ETK_K1 K2ETK_K2	30	90	3	2,1	T	Z			S	OB
4	ELR051331L	Power Quality Assessment			1			S2RES_U13 K2ETK_K1 K2ETK_K2	15	30	1	0,7	T	Z		P	S	OB
5	ELR051332W	Circuits and Systems	2					K2ETK_W1	30	90	3	2,1	T	E			K	OB
6	ELR051332C	Circuits and Systems		1				K2ETK_U1 K2ETK_K1	15	30	1	0,7	T	Z		P	K	OB
7	ELR052131W	Power Systems Faults	2					K2ETK_W3 K2ETK_K1	30	120	4	2,8	T	E			K	OB
8	ELR052139P	Fault Calculations				2		S2RES_U14 K2ETK_K2	30	60	2	1,4	T	Z		P	S	OB
9	ELR053225W	Dynamics and Control of AC and DC Drives	2					K2ETK_W4	30	120	4	2,8	T	E			K	OB
10	ELR053225L	Dynamics and Control of AC and DC Drives			1			K2ETK_U3 K2ETK_K2 K2ETK_K6	15	30	1	0,7	T	Z		P	K	OB
11	ELR053225P	Dynamics and Control of AC and DC Drives				1		K2ETK_U3 K2ETK_K2 K2ETK_K6	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_K3	15	30	1	0,7	T	Z		P	S	OB
<b>Total</b>			<b>11</b>	<b>2</b>	<b>3</b>	<b>3</b>			<b>285</b>	<b>810</b>	<b>27</b>	<b>18,9</b>						

### 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
<b>Optional courses block: Foreign Language</b>								<b>ECTS</b>		<b>3</b>		<b>hours</b>		<b>4</b>				
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

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: 25

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	ELR052133W	Simulation and Analysis of Power System Transients	1					S2RES_W15	15	30	1	0,7	T	Z			S	OB
2	ELR052133L	Simulation and Analysis of Power System Transients			2			S2RES_U16 K2ETK_K6 K2ETK_K7	30	60	2	1,4	T	Z		P	S	OB
3	ELR052137W	Protection and Control of Distributed Energy Sources 1	1					S2RES_W2	15	60	2	1,4	T	Z			S	OB
4	ELR052137L	Protection and Control of Distributed Energy Sources 1			1			S2RES_U2 K2ETK_K1 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
5	ELR052331W	Renewable Energy Sources	2					S2RES_W5 K2ETK_K6	30	60	2	1,4	T	E			S	OB
6	ELR052331S	Renewable Energy Sources					1	S2RES_U5 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
7	ELR052332W	Water Power Plants 1	2					S2RES_W4	30	60	2	1,4	T	Z			S	OB
8	ELR052334W	Energy Storage Systems	1					S2RES_W3	15	60	2	1,4	T	E			S	OB
9	ELR052334P	Energy Storage Systems				1		S2RES_U3 K2ETK_K7	15	30	1	0,7	T	Z		P	S	OB
10	ELR052536W	Integration of Distributed Resources in Power Systems	2					S2RES_W6 K2ETK_K6	30	60	2	1,4	T	E			S	OB
11	ELR052536L	Integration of Distributed Resources in Power Systems			1			S2RES_U6 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
12	ELR053110W	Modelling of Electrical Machines	1					S2RES_W10	15	30	1	0,7	T	Z			S	OB
13	ELR053110P	Modelling of Electrical Machines				2		S2RES_U10 K2ETK_K6	30	60	2	1,4	T	Z		P	S	OB
14	ELR053228W	Power Electronics	2					S2RES_W1 K2ETK_K7	30	60	2	1,4	T	Z			S	OB
15	ELR053228L	Power Electronics			1			S2RES_U1 K2ETK_K7	15	30	1	0,7	T	Z		P	S	OB
16	ELR053229W	Electromechanical Systems in Renewable Energy	1					S2RES_W7	15	30	1	0,7	T	Z			S	OB
17	ELR053229S	Electromechanical Systems in Renewable Energy					1	S2RES_U17 K2ETK_K1	15	30	1	0,7	T	Z		P	S	OB
Total			13		5	3	2		345	750	25	17,5						

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	ELR055105Q	Diploma placement 4 weeks				40		S2RES_U21 K2ETK_K6	160	120	4	2,8	T	Z		P	S	W
<b>Optional courses block: Management</b>								<b>ECTS</b>		<b>2</b>		<b>hours</b>		<b>1</b>				
1	ZMR052538W	Market Mechanisms in Power Systems with Distributed Energy	1					K2ETK_W6 K2ETK_K3 K2ETK_K6	15	50	2	1,4	T	Z	O		KO	W
2	ZMZ001499W	Fundamentals of Management	1					K2ETK_W6 K2ETK_K3 K2ETK_K6	15	50	2	1,4	T	Z	O		KO	W

**Altogether in semester**

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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	hours	hours	points	points
14	0	5	3	2	360	800	27	18,9
0	0	0	40	0	160	120	4	2,8

### Semester 3

#### Obligatory courses

number of ECTS points: 20

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	ELR051337W	Photovoltaic Cells	2					S2RES_W8 K2ETK_K6	30	60	2	1,4	T	E			S	OB
2	ELR051337L	Photovoltaic Cells			1			S2RES_U8 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
3	ELR051338W	Industrial ecology - selected problems	1					S2RES_W9 K2ETK_K3	15	30	1	0,7	T	Z			S	OB
4	ELR051338S	Industrial ecology - selected problems					1	S2RES_U9 K2ETK_K3	15	30	1	0,7	T	Z		P	S	OB
5	ELR052135W	Artificial Intelligence Techniques	2					S2RES_W16	30	60	2	1,4	T	Z			S	OB
6	ELR052135P	Artificial Intelligence Techniques					1	S2RES_U18 K2ETK_K2	15	30	1	0,7	T	Z		P	S	OB
7	ELR052141S	Protection and Control of Distributed Energy Sources 2					1	S2RES_U7	15	30	1	0,7	T	Z		P	S	OB
8	ELR052336S	Water Power Plants 2					1	S2RES_U4 K2ETK_K7	15	30	1	0,7	T	Z		P	S	OB
9	ELR052537W	Legal Regulations and Investments in Power Systems with Distributed Energy Sources	2					S2RES_W12 K2ETK_K6	30	60	2	1,4	T	Z			S	OB
10	ELR052537S	Legal Regulations and Investments in Power Systems with Distributed Energy Sources					1	S2RES_U12 K2ETK_K6	15	30	1	0,7	T	Z		P	S	OB
11	ELR053311W	Electromagnetic Compatibility	2					S2RES_W11 K2ETK_K7	30	60	2	1,4	T	Z			S	OB
12	ELR053311L	Electromagnetic Compatibility			1			S2RES_U11 K2ETK_K7	15	30	1	0,7	T	Z		P	S	OB
13	ELR053312W	Measurement methods and techniques	2					K2ETK_W5 K2ETK_K7	30	60	2	1,4	T	Z			PD	OB
14	ELR053312L	Measurement methods and techniques			2			K2ETK_U4 K2ETK_K7	30	60	2	1,4	T	Z		P	PD	OB
Total			11		4	1	4		300	600	20	14						

**Optional courses**

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational effect symbol	minimum		hours in semester,				ECTS points			
			lec	cl	lab	pr	sem		135		9		Course					
									Number of hours	Number of ECTS points	Form of course	Way of crediting	university wide	practical	kind	type		
1	ELR055117P ELR055127P ELR055137P	Diploma Project				8		S2RES_U22 K2ETK_K6	120	240	8	5,6	T	Z		P	S	W
<b>Optional courses block: Law</b>									<b>ECTS</b>		<b>1</b>		<b>hours</b>		<b>1</b>			
1	PRR051231W	Intellectual property rights in the world	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1	0,7	T	Z	O		KO	W
2	PRR051232W	Inventions and patents	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1	0,7	T	Z	O		KO	W
3	PRR051233W	Industrial property and copyright for engineers	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1	0,7	T	Z	O		KO	W
4	PRZ001007W	Protection of Intellectual Property	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	1	0,7	T	Z	O		KO	W
5	PRZ001008W	International Law	1					K2ETK_W7 K2ETK_K3 K2ETK_K5	15	25	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				
12	0	4	9	4	435	865	29	20,3

## Semester 4

### Optional courses

No.	Course code	Name of course	Weekly number of hours					Field-of-study educational effect symbol	minimum		hours in semester,		ECTS points					
			lec	cl	lab	pr	sem		300		30		Course					
									Number of hours		Number of ECTS points		Form of course	Way of crediting	university wide	practical	kind	type
ZZU	CNPS	total	BK classes	ECTS	hours	ECTS	hours											
1	ELR055108S	Diploma seminar					2	S2RES_U23 K2ETK_K6	30	90	3	2,1	T	Z		P	S	W
2	ELR055119DP ELR055129DP ELR055139DP	Master's thesis					12	S2RES_U24 K2ETK_K4 K2ETK_K6	180	540	18	12,6	T	Z		P	S	W
<b>Optional courses block: Social Sciences and Ethics</b>										<b>ECTS</b>		<b>2</b>	<b>hours</b>		<b>1</b>			
1	FLH051721S	Ethics in bussiness					1	K2ETK_U7 K2ETK_K6	15	50	2	1,4	T	Z	O	P	KO	W
2	PKH053721S	The art of public speaking					1	K2ETK_U7 K2ETK_K6	15	50	2	1,4	T	Z	O	P	KO	W
3	PKH053821S	Social communication					1	K2ETK_U7 K2ETK_K6	15	50	2	1,4	T	Z	O	P	KO	W
<b>Optional courses block: A</b>										<b>ECTS</b>		<b>4</b>	<b>hours</b>		<b>3</b>			
1	ELR051230W	Visual Engineering Environments and Graphical Languages	1					S2RES_W17	15	30	1	0,7	T	E			S	W
2	ELR051230L	Visual Engineering Environments and Graphical Languages			2			S2RES_U19 K2ETK_K2	30	90	3	2,1	T	Z		P	S	W
3	ELR051334W	Signal and Systems	2					S2RES_W17	30	90	3	2,1	T	E			S	W
4	ELR051334C	Signal and Systems		1				S2RES_U19 K2ETK_K1	15	30	1	0,7	T	Z		P	S	W
5	ELR051335W	Advanced Signal Processing Methods	2					S2RES_W17	30	90	3	2,1	T	E			S	W
6	ELR051335C	Advanced Signal Processing Methods		1				S2RES_U19 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
7	ELR052234W	PLC and Wireless Communications for Monitoring and Metering	2					S2RES_W17 K2ETK_K6	30	90	3	2,1	T	E			S	W
8	ELR052234S	PLC and Wireless Communications for Monitoring and Metering					1	S2RES_U19 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
9	ELR052335W	Advanced Substations and Electrical Equipment	2					S2RES_W17	30	90	3	2,1	T	E			S	W
10	ELR052335P	Advanced Substations and Electrical Equipment					1	S2RES_U19 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
11	ELR052534W	Power System Modelling	2					S2RES_W17	30	90	3	2,1	T	E			S	W
12	ELR052534P	Power System Modelling					1	S2RES_U19 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
13	ELR052535W	Computer Control of Power System	2					S2RES_W17	30	90	3	2,1	T	E			S	W
14	ELR052535S	Computer Control of Power System					1	S2RES_U19 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W

Optional courses block: B							ECTS		3	hours		2					
1	ELR052136W	Design of logic circuits	1				S2RES_W18	15	60	2	1,4	T	Z			S	W
2	ELR052136L	Design of logic circuits			1		S2RES_U20 K2ETK_K1 K2ETK_K2 K2ETK_K7	15	30	1	0,7	T	Z		P	S	W
3	ELR052138W	Electrical Power Engineering – excursionary activities	1				S2RES_W18 K2ETK_K6	15	60	2	1,4	T	Z			S	W
4	ELR052138S	Electrical Power Engineering – excursionary activities				1	S2RES_U20 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
5	ELR053226W	Fuzzy Logic Control	1				S2RES_W18	15	60	2	1,4	T	Z			S	W
6	ELR053226L	Fuzzy Logic Control			1		S2RES_U20 K2ETK_K6	15	30	1	0,7	T	Z		P	S	W
7	ELR053227W	Control of Power Electronic Converters	1				S2RES_W18 K2ETK_K6	15	60	2	1,4	T	Z			S	W
8	ELR053227L	Control of Power Electronic Converters			1		S2RES_U20 K2ETK_K6	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	890	30	21



## 2. Set of examinations in semestral arrangement

Course code	Names of courses ending with examination	Semester
ELR051332W	Circuits and Systems	1
ELR052131W	Power Systems Faults	1
ELR053225W	Dynamics and Control of AC and DC Drives	1
ELR052331W	Renewable Energy Sources	2
ELR052334W	Energy Storage Systems	2
ELR052536W	Integration of Distributed Resources in Power Systems	2
ELR051337W	Photovoltaic Cells	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	5
2	5
3	5

Opinion of student government legislative body

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Date

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Name and surname, signature of student representative

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Date

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Dean's signature