

## PLAN OF STUDY

FACULTY: MECHANICAL AND POWER ENGINEERING

MAIN FIELD OF STUDY: POWER ENGINEERING

EDUCATION LEVEL: 2nd level, Master of Science

FORM OF STUDIES: full-time

PROFILE: general academic

SPECIALIZATION: **REFRIGERATING, HEATING AND AIR-CONDITIONING**

LANGUAGE OF STUDY: polish

Faculty Council Resolution of 30.09.2015  
In effect since 01.10.2015

## Plan of studies structure in point layout

30		<b>Master Individual Student Project</b>	
28			
26			
24			
22			<b>Master Thesis</b>
20			
18			
16			
14	<b>Quantum Physics</b>		
12			
10	<b>Numerical Methods</b>		<b>Master Seminar</b>
8			
6	<b>Probability Theory</b>		
4		<b>Humanities Course</b>	
2	<b>Sporting Classes</b>		<b>Marketing and Management Course</b>
	<b>Foreign Language</b>	<b>Foreign Language</b>	
	<b>Sem.1</b>	<b>Sem.2</b>	<b>Sem.3</b>

Legend

Basic and obligatory courses
General and obligatory courses
General and optional courses
Field-of-studies and obligatory courses
Field-of-studies and optional courses
Specialization and optional courses

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

## Semester 1

### Obligatory courses number of ECTS points 12

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol <b>GK</b> )	Weekly number of hours					Field-of- study educational effect symbol	Number of hours		Number of ECTS points		Form <sup>2</sup> of course/group of courses	Way <sup>3</sup> of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes <sup>1</sup>			university- wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	ESN0200	Quantum Physics	2					K2ENG_W03	30	90	3	1,5	T	E			PD	Ob
2	ESN0905	Probability Theory	2					K2ENG_W01	30	90	3	1,5	T	E			PD	Ob
3	ESN0905	Probability Theory		1				K2ENG_U05	15	30	1	0,75	T	Z		P	PD	Ob
4	ESN0502	Numerical Methods	2					K2ENG_W02	30	90	3	1,5	T	E			PD	Ob
5	ESN0502	Numerical Methods			2			K2ENG_U06	30	60	2	1,5	T	Z		P	PD	Ob
Total			6	1	2				135	360	12	6,75						

### Optional courses (minimum 270 hours in semester) number of ECTS points 18

No.	Course/group of courses code	Name of course/group of courses (denote group of courses with symbol <b>GK</b> )	Weekly number of hours					Field-of- study educational effect symbol	Number of hours		Number of ECTS points		Form <sup>2</sup> of course/group of courses	Way <sup>3</sup> of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes <sup>1</sup>			university- wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	JZL100655BK	Foreign Language (continuation), level B+		1				K2ENG_U04	15	30	1	0,75	T	Z	O	P	KO	W
2	WFW010000BK	Sporting Classes		1				K2ENG_K06	15	15	1	1	T	Z	O	P	KO	W
3	ESN0241	Heat Management	1					S2CCK_W02	15	30	1	0,5	T	Z			S	W
4	ESN0241	Heat Management		1				S2CCK_U02	15	30	1	0,75	T	Z		P	S	W
5	ESN1152	Thermodynamic Basis of Heating Engineering	2					S2CCK_W10	30	60	2	1	T	Z			S	W
6	ESN1073	Refrigerating Systems	2					S2CCK_W01	30	60	2	1	T	Z			S	W
7	ESN1073	Refrigerating Systems		1				S2CCK_U08	15	30	1	0,75	T	Z		P	S	W
8	ESN1073	Refrigerating Systems			2			S2CCK_U01	30	60	2	1,5	T	Z		P	S	W
9	ESN1024	Sorption Energetic Systems	2					S2CCK_W06	30	60	2	1	T	Z			S	W
10	ESN1024	Sorption Energetic Systems		1				S2CCK_U03	15	30	1	0,75	T	Z		P	S	W
11	ESN1024	Sorption Energetic Systems				1		S2CCK_U07	15	30	1	0,75	T	Z		P	S	W

<sup>1</sup>BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

<sup>2</sup>Traditional – enter T, remote – enter Z

<sup>3</sup>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)

<sup>4</sup>University-wide course /group of courses – enter O

<sup>5</sup>Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

<sup>6</sup>KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

<sup>7</sup>Optional – enter W, obligatory – enter Ob

No.	Course/group of courses code	Name of course/group of courses (denote group of courses with symbol <b>GK</b> )	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form <sup>2</sup> of course/group of courses	Way <sup>3</sup> of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes <sup>1</sup>			university-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
12	ESN0557	Heat Carriers and Accumulators	1					S2CCK_W11	15	30	1	0,5	T	Z			S	W
13	ESN0303	Pollutants Emission Control	1					S2CCK_W04	15	30	1	0,5	T	Z			S	W
14	ESN0303	Pollutants Emission Control			1			S2CCK_U05 K2ENG_K03	15	30	1	0,75	T	Z		P	S	W
Total			9	5	3	1			270	525	18	11,5						

### Altogether in semester 1

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes <sup>1</sup>
lec	cl	lab	pr	sem				
15	6	5	1		405	885	30	18,25

### Semester 2

#### Obligatory courses number of ECTS points 8

No.	Course/group of courses code	Name of course/group of courses (denote group of courses with symbol <b>GK</b> )	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form <sup>2</sup> of course/group of courses	Way <sup>3</sup> of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes <sup>1</sup>			university-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	ESN0553	Mathematical Modelling of Energy Generation Installations	2					K2ENG_W05	30	90	3	1,5	T	E			K	Ob
2	ESN0553	Mathematical Modelling of Energy Generation Installations			4			K2ENG_U07	60	60	2	1,5	T	Z		P	K	Ob
3	ESN1115	New Generation Energy Technologies	2					K2ENG_W04	30	90	3	1,5	T	E			K	Ob
Total			4		4				120	240	8	4,5						

<sup>1</sup>BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

<sup>2</sup>Traditional – enter T, remote – enter Z

<sup>3</sup>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)

<sup>4</sup>University-wide course /group of courses – enter O

<sup>5</sup>Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

<sup>6</sup>KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

<sup>7</sup>Optional – enter W, obligatory – enter Ob

### Optional courses (minimum 330 hours in semester) number of ECTS points 22

No.	Course/group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form <sup>2</sup> of course/group of courses	Way <sup>3</sup> of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes <sup>1</sup>			universit y-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	JZL100655BK	Foreign Language (second), any level		3				K2ENG_U09	45	60	2	1,5	T	Z	O	P	KO	W
2	HS1100400BK	Humanities	1					K2ENG_W06 K2ENG_K02	15	60	2	1	T	Z	O		KO	W
3	ESN0251	Installations for Environment Protection - Optimalization and Exploitation	1					S2CCK_W08	15	30	1	0,5	T	Z			S	W
4	ESN0251	Installations for Environment Protection - Optimalization and Exploitation					1	S2CCK_U09 K2ENG_K01 K2ENG_K02 K2ENG_K03	15	30	1	0,75	T	Z		P	S	W
5	ESN1074	Power Systems Based on Renewable and Waste Energy	1					S2CCK_W09	15	30	1	0,5	T	Z			S	W
6	ESN1074	Power Systems Based on Renewable and Waste Energy		1				S2CCK_U06	15	30	1	0,75	T	Z		P	S	W
7	ESN1246	Ventilation and Air-conditioning	1					S2CCK_W07	15	30	1	0,5	T	Z			S	W
8	ESN1246	Ventilation and Air-conditioning			1			S2CCK_U11	15	30	1	0,75	T	Z		P		W
9	ESN0276	Heating and Air-condition Installation	1					S2CCK_W03	15	30	1	0,5	T	Z			S	W
10	ESN0276	Heating and Air-condition Installation			1			S2CCK_U11	15	30	1	0,75	T	Z		P	S	W
11	ESN0276	Heating and Air-condition Installation					1	S2CCK_U04	15	30	1	0,75	T	Z		P	S	W
12	ESN0276	Cryogenic Installations	2					S2CCK_W12	30	60	2	1	T	Z			S	W
13	ESN0277	Cryogenic Installations					1	S2CCK_U12	15	30	1	0,75	T	Z		P	S	W
14	ESN0277	Heat Pumps and Heat Transformers	1					S2CCK_W05 K2ENG_K02	15	30	1	0,5	T	Z			S	W
15	ESN0822	Heat Pumps and Heat Transformers					1	S2CCK_U10	15	30	1	0,75	T	Z		P	S	W
16	ESN0822	Master Individual Student Project					4	K2ENG_U01 K2ENG_U03 K2ENG_K04 K2ENG_K05	60	120	4	1	T	Z		P	K	W
Total			8	4	2	6	2		330	660	22	12,25						

### Altogether in semester 2

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes <sup>1</sup>
lec	cl	lab	pr	sem				
12	4	6	6	2	450	900	30	16,75

<sup>1</sup>BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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<sup>3</sup>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)

<sup>4</sup>University-wide course /group of courses – enter O

<sup>5</sup>Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

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<sup>7</sup>Optional – enter W, obligatory – enter Ob

## Semester 3

### Obligatory courses number of ECTS points 10

No.	Course/group of courses code	Name of course/group of courses (denote group of courses with symbol <b>GK</b> )	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form <sup>2</sup> of course/group of courses	Way <sup>3</sup> of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes <sup>1</sup>			universit y-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	ESN1062	Energy Systems	2					K2ENG_W08	30	60	2	1	T	Z			K	Ob
2	ESN1062	Energy Systems		1				K2ENG_U08	15	30	1	0,75	T	Z		P	K	Ob
3	ESN1300	Environmental Management	2					K2ENG_W06 K2ENG_K02	30	60	2	1	T	Z			K	Ob
4	ESN1380	Diploma Seminar					2	K2ENG_U01 K2ENG_U02 K2ENG_K01 K2ENG_K03 K2ENG_K04 K2ENG_K05	30	60	2	1,5	T	Z		P	K	Ob
5	ESN0367	Marketing and Management	2					K2ENG_W07	30	90	3	1,5	T	Z			KO	Ob
Total			6	1			2		135	300	10	5,75						

### Optional courses number of ECTS points 20

No.	Course/group of courses code	Name of course/group of courses (denote group of courses with symbol <b>GK</b> )	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form <sup>2</sup> of course/group of courses	Way <sup>3</sup> of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes <sup>1</sup>			universit y-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	ESN1430	Master Thesis						K2ENG_U01 K2ENG_U02 K2ENG_U03 K2ENG_K01 K2ENG_K04 K2ENG_K05		600	20	4	T	Z		P		W
Total										600	20	4						

<sup>1</sup>BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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<sup>3</sup>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)

<sup>4</sup>University-wide course /group of courses – enter O

<sup>5</sup>Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

<sup>6</sup> KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

<sup>7</sup> Optional – enter W, obligatory – enter Ob

### Altogether in semester 3

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes <sup>1</sup>
lec	cl	lab	pr	sem				
6	1			2	135	900	30	9,75

### 2. Set of examinations in semestral arrangement

Course code	Names of courses ending with examination	Semester
ESN0905 ESN0502 ESN0200	1. Probability Theory 2. Numerical Methods 3. Quantum Physics	1
ESN1115 ESN0553	1. New Generation Energy Technologies 2. Mathematical Modelling of Energy Generation Installations	2

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

Semester	Allowable deficit of ECTS points after semester
1	10
2	0