

## **PLAN OF STUDY**

FACULTY: MECHANICAL AND POWER ENGINEERING

MAIN FIELD OF STUDY: MECHANICAL ENGINEERING AND MACHINE BUILDING

EDUCATION LEVEL: 2nd level, Master of Science

FORM OF STUDIES: full-time

PROFILE: general academic

SPECIALIZATION: **LOW TEMPERATURE ENGINEERING**

LANGUAGE OF STUDY: polish

Faculty Council Resolution of 20.09.2017  
In effect since 01.10.2017

## Plan of studies structure in point layout

30			
29		master	
28		individual	
27		student project	
26			
25			
24			master
23			thesis
22			
21			
20			
19			
18			
17			
16			
15			
14			
13			
12			
11			
10			technical
9		modelling and	safety
8		optimization	
7			master
6			seminar
5		management	
4		course	
3	mechanics		
2	analytical	foreign	humanities
1	foreign language	language	
	sem. 1	sem. 2	sem. 3

basic and obligatory courses
general and obligatory courses
general and optional courses
obligatory main-field-of-study courses
optional main-field-of-study courses
optional/specialization courses

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

## Semester 1

### 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 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>			university-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	MSN0462	Mechanics Analytical	2					K2MBM_W03	30	60	2	1	T	Z			K	Ob
2	MSN1363	Modern Engineering Materials	1					K2MBM_W02	15	30	1	0,5	T	Z			K	Ob
3	MSN1363	Modern Engineering Materials			1			K2MBM_U02	15	30	1	0,75	T	Z		P	K	Ob
4	MSN1363	Modern Engineering Materials				1		K2MBM_U06	15	30	1	0,75	T	Z		P	K	Ob
5	MSN0530	Mechatronics and Control Systems	2					K2MBM_W01	30	90	3	1,5	T	E			K	Ob
6	MSN0530	Mechatronics and Control Systems			2			K2MBM_U01	30	60	2	1,5	T	Z		P	K	Ob
Total			5		3		1		135	300	10	6						

### Optional courses (minimum 300 hours in semester) number of ECTS points 20

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>			university-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	JZL100709	Foreign Language (continuation), level B+		1				K2MBM_U08	15	30	1	0,75	T	Z	O	P	KO	W
2	MSN1227	Thermodynamic Fundamentals of Low Temperature Engeenering	2					S2INN_W01	30	60	2	1	T	Z			S	W
3	MSN1227	Thermodynamic Fundamentals of Low Temperature Engeenering				1		S2INN_U01	15	30	1	0,75	T	Z		P	S	W
4	MSN0344	Cryogenics	2					S2INN_W02	30	60	2	1	T	E			S	W
5	MSN0344	Cryogenics		2				S2INN_U02	30	60	2	1,5	T	Z		P	S	W
6	MSN0344	Cryogenics			2			S2INN_U03	30	60	2	1,5	T	Z		P	S	W
7	MSN0162	Compressor and Absorption Refrigeration	2					S2INN_W03	30	60	2	1	T	E			S	W
8	MSN0162	Compressor and Absorption Refrigeration		1				S2INN_U04	15	30	1	0,75	T	Z		P	S	W
9	MSN0162	Compressor and Absorption Refrigeration			2			S2INN_U05	30	60	2	1,5	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 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>			university-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
10	MSN0411	Low Temperature Materials, Refrigerants and Cryogenic Fluids	2					S2INN_W04	30	60	2	1	T	Z			S	W
11	MSN0621	Standards and Design Codes	1					S2INN_W05	15	30	1	0,5	T	Z			S	W
12	MSN0272	Computer Aided Designing of Low Temperature Devices			2			S2INN_U06	30	60	2	1,5	T	Z		P	S	W
Total			9	4	6				300	600	20	12,75						

### 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				
13	2	9	3	2	435	900	30	19

### Semester 2

#### Obligatory courses number of ECTS points 5

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>			university-wide <sup>4</sup>	practical <sup>5</sup>	kind <sup>6</sup>	type <sup>7</sup>
1	MSN0613	Modelling and Optimization	1					K2MBM_W04	15	60	2	1	T	E			K	Ob
2	MSN0613	Modelling and Optimization			2			K2MBM_U03	30	90	3	2,25	T	Z		P	K	Ob
Total			1	2					45	150	5	3,25						

<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 375 hours in semester) number of ECTS points 25

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	JZL100710BK	Foreign Language (second), any level		3				K2MBM_U09	45	60	2	1,5	T	Z	O	P	KO	W
2	ZSN100400BK	Management Course	2					K2MBM_W08 K2MBM_K05	30	90	3	1,5	T	Z	O		KO	W
3	MSN1052	Energy Conversion Systems	2					S2INN_W06	30	60	2	1	T	E			S	W
4	MSN1052	Energy Conversion Systems				2		S2INN_U07	30	60	2	1,5	T	Z		P	S	W
5	MSN1351	Low Temperature Devices and Installation	1					S2INN_W07	15	30	1	0,5	T	Z			S	W
6	MSN1351	Low Temperature Devices and Installation				3		S2INN_U08	45	90	3	2,25	T	Z		P	S	W
7	MSN1152	Gas and Cryogenic Technologies	1					S2INN_W08	15	30	1	0,5	T	Z			S	W
8	MSN1152	Gas and Cryogenic Technologies					1	S2INN_U09	15	30	1	0,75	T	Z		P	S	W
9	MSN1053	Cryogenic Systems	1					S2INN_W09	15	30	1	0,5	T	Z			S	W
10	MSN1053	Cryogenic Systems				1		S2INN_U10	15	30	1	0,75	T	Z		P	S	W
11	MSN0615	Applied Superconductivity	1					S2INN_W10	15	30	1	0,5	T	Z			S	W
12	MSN0622	Numerical Analysis of Flow Phenomena			1			S2INN_U11	15	30	1	0,75	T	Z		P	S	W
13	MSN1534	Master Individual Student Project				6		K2MBM_U07 K2MBM_K01 K2MBM_K04 K2MBM_K05	90	180	6	1	T	Z		P	K	W
Total			8	3	1	12	1		375	750	25	13						

### 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				
9	5	1	12	1	420	900	30	16,25

<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

## Semester 3

### Obligatory courses number of ECTS points 5

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	MSN1492	Integrated Production Systems	2					K2MBM_W06	30	60	2	1	T	Z			K	Ob
2	MSN1492	Integrated Production Systems			1			K2MBM_U05	15	30	1	0,75	T	Z		P	K	Ob
3	MSN1560	Diploma Seminar					2	K2MBM_U06 K2MBM_U07 K2MBM_K01 K2MBM_K03 K2MBM_K04 K2MBM_K05	30	60	2	1,5	T	Z		P	K	Ob
Total			2		1		2		75	150	5	3,25						

### Optional courses (minimum 60 hours in semester) number of ECTS points 25

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	HSN100400BK	Humanities Course	1					K2MBM_W07 K2MBM_K02 K2MBM_K06	15	60	2	1	T	Z	O		KO	W
		Technical Safety:																
	MSN0033	Failure Analysis of Machine and Devices	2					K2MBM_W05	30	60	2	1	T	Z			K	W
	MSN0033	Failure Analysis of Machine and Devices			1			K2MBM_U04	15	30	1	0,75	T	Z		P	K	W
	MSN0034	Failure Analysis of Machines and Devices	2					K2MBM_W05	30	60	2	1	T	Z			K	W
	MSN0034	Failure Analysis of Machines and Devices			1			K2MBM_U04	15	30	1	0,75	T	Z		P	K	W
3	MSN1610	Master Thesis						K2MBM_U07 K2MBM_K01 K2MBM_K04 K2MBM_K05		600	20	4	T	Z		P	K	W
Total			3		1				60	750	25	6,75						

<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

### 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				
5		2		2	135	900	30	10

### 2. Set of examinations in semestral arrangement

Course code	Names of courses ending with examination	Semester
MSN0530 MSN0344 MSN0162	1. Mechatronics and Control Systems 2. Cryogenics 3. Compressor and Absorption Refrigeration	1
MSN0613 MSN1052	1. Modelling and Optimization 2. Energy Conversion Systems	2

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

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