

## **PLAN OF STUDIES**

**FACULTY: FACULTY OF MECHANICAL AND POWER ENGINEERING**

**MAIN FIELD OF STUDY: . Mechanical Engineering and Machine Building**

in area of science Refrigeration and Criogenics

**EDUCATION LEVEL: 2nd level, magister inżynier**

**FORM OF STUDIES: full-time**

**PROFILE: general academic**

**SPECIALIZATION: REFRIGERATION AND CRYOGENICS**

**LANGUAGE OF STUDY: English**

Faculty Council Resolution of 26.09.2012

In effect since 01.10.2012

Edited adjustment\_April 2014

## Plan of studies structure in point layout

30			
28			
26		<b>Master Individual Student Project</b>	<b>Master Thesis</b>
24			
22			
20			
18			
16			
14			
12			
10			<b>Master Seminar</b>
8			
6			
4			
2	<b>Foreign Language</b>	<b>Foreign Language</b>	<b>Management Humanities</b>
	sem.1	sem.2	sem.3

### Legend

General and optional courses
Obligatory courses
Optional courses
Specialization/optional courses

<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

# 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 <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	MSN0463	Mechanics analytical	2					K2MBM_W03	30	60	2	1,00	T	Z			K	Ob
2	MSN1362	Modern Engineering Materials	1					K2MBM_W02	15	30	1	0,50	T	Z			K	Ob
3	MSN1362	Modern Engineering Materials			1			K2MBM_U02	15	30	1	0,75	T	Z		P	K	Ob
4	MSN1362	Modern Engineering Materials					1	K2MBM_U06	15	30	1	0,75	T	Z		P	K	Ob
5	MSN0531	Mechatronics and Control Systems	2					K2MBM_W01	30	90	3	1,50	T	E			K	Ob
6	MSN0531	Mechatronics and Control Systems			2			K2MBM_U01 K2MBM_K02 K2MBM_K03 K2MBM_K04	30	60	2	1,50	T	Z		P	K	Ob
Total			5		3		1		135	300	10	6,00						

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

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	JZL10065BK	Foreign Language (continuation), level B2+		1				K2MBM_U08	15	30	1	0,75	T	Z	O	P	KO	W
2	MSN1225	Thermodynamic Fundamentals of Refrigeration, Cryogenics and Low Temperature Physics	2					S2RAC_W01	30	60	2	1,00	T	Z			S	W
3	MSN1225	Thermodynamic Fundamentals of Refrigeration, Cryogenics and Low Temperature Physics					1	S2RAC_U01	15	30	1	0,75	T	Z		P	S	W
4	MSN0161	Compressor Refrigeration Systems	2					S2RAC_W02	30	60	2	1,00	T	E			S	W
5	MSN0161	Compressor Refrigeration Systems		2				S2RAC_U02	30	60	2	1,50	T	Z		P	S	W
6	MSN0161	Compressor Refrigeration Systems			2			S2RAC_U03	30	60	2	1,50	T	Z		P	S	W
7	MSN0183	Refrigerants and Coolants	1					S2RAC_W03	15	30	1	0,50	T	Z			S	W

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<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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8	MSN0831	Heat Pumps	1					S2RAC_W04	15	30	1	0,50	T	Z			S	W
9	MSN0831	Heat Pumps				1		S2RAC_U04	15	30	1	0,75	T	Z		P	S	W
10	MSN1051	Air-condition Systems	1					S2RAC_W05	15	30	1	0,50	T	Z			S	W
11	MSN0341	Cryogenics	2					S2RAC_W06	30	60	2	1,00	T	E			S	W
12	MSN0341	Cryogenics		1				S2RAC_U05	15	30	1	0,75	T	Z		P	S	W
13	MSN0341	Cryogenics			2			S2RAC_U06	30	60	2	1,50	T	Z		P	S	W
14	MSN0342	Cryogenic Materials and Fluids	1					S2RAC_W07	15	30	1	0,50	T	Z			S	W
Total			10	4	4	1	1		300	600	20	12,50						

### 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 for BK classes <sup>1</sup>
lec	cl	lab	pr	sem				
15	4	7	1	2	435	900	30	18,50

## 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 <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	MSN0614	Modelling and Optimisation	1					K2MBM_W04	15	60	2	1,00	T	E			K	Ob
2	MSN0614	Modelling and Optimisation			2			K2MBM_U03	30	90	3	2,25	T	Z		P	K	Ob
Total			1		2				45	150	5	3,25						

### Optional courses (minimum 345 hours in semester, 25 ECTS points)

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 (second), any level			3			K2MBM_U09	45	60	2	1,50	T	Z	O	P	KO	W
2	MSN1041	Cooling Systems and Refrigeration Plants	1					S2RAC_W08	15	30	1	0,50	T	Z			S	W
3	MSN1041	Cooling Systems and Refrigeration Plants					2	S2RAC_U07	30	60	2	1,50	T	Z		P	S	W
4	MSN0121	Absorption Refrigeration	2					S2RAC_W09	30	60	2	1,00	T	E			S	W
5	MSN0121	Absorption Refrigeration		1				S2RAC_U08	15	30	1	0,75	T	Z		P	S	W
6	MSN0121	Absorption Refrigeration					1	S2RAC_U09	15	30	1	0,75	T	Z		P	S	W

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7	MSN1151	Gas and Cryogenic Technologies	2					S2RAC_W10	30	60	2	1,00	T	Z			S	W
8	MSN1151	Gas and Cryogenic Technologies				2		S2RAC_U10	30	60	2	1,50	T	Z		P	S	W
9	MSN0035	Applied Superconductivity	1					S2RAC_W11	15	30	1	0,50	T	Z			S	W
10	MSN0343	Cryogenic Systems	1					S2RAC_W12	15	30	1	0,50	T	Z			S	W
11	MSN0245	Introduction to Numerical Flow Phenomena Analysis				1		S2RAC_U11	15	30	1	0,75	T	Z		P	S	W
12	MSN1533	Master Individual Student Project					6	K2MBM_U07 K2MBM_K01 K2MBM_K04 K2MBM_K05	90	270	9	4,00	T	Z		P	K	W
Total			7	4	1	11			345	750	25	12,25						

### 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 for BK classes <sup>1</sup>
lec	cl	lab	pr	sem				
8	4	3	11		390	900	30	17,50

### Semester 3

#### 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	MSN1493	Integrated Production Systems	2					K2MBM_W06	30	60	2	1,00	T	Z			K	Ob
2	MSN1493	Integrated Production Systems			1			K2MBM_U05	15	30	1	0,75	T	Z		P	K	Ob
3	MSN0034	Failure Analysis of Machines and Devices	2					K2MBM_W05 K2MBM_K05	30	60	2	1,00	T	Z			K	Ob
4	MSN0034	Failure Analysis of Machines and Devices			1			K2MBM_U04	15	30	1	0,75	T	Z		P	K	Ob
5	MSN1561	Master Seminar					2	K2MBM_U06 K2MBM_U07 K2MBM_K01 K2MBM_K03 K2MBM_K04 K2MBM_K05	30	60	2	1,50	T	Z		P	K	Ob
Total			4		2		2		120	240	8	5,00						

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### Optional courses (minimum 300 hours in semester, 25 ECTS points)

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			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	HSN100200BK	Humanities Course	1					K2MBM_W07 K2MBM_K02	15	30	1	0,50	T	Z	O		KO	W
2	ZSN100200BK	Management Course	1					K2MBM_W08	15	30	1	0,50	T	Z	O		KO	W
3	MSN1611	Master Thesis						K2MBM_U07 K2MBM_K01 K2MBM_K04 K2MBM_K05		600	20	4,00	T	Z		P	K	W
Total																		

### 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 for BK classes <sup>1</sup>
lec	cl	lab	pr	sem				
6		2		2	150	900	30	10,00

### 2. Set of examinations in semestral arrangement

Course code	Names of courses ending with examination	Semester
MSN0531 MSN0161 MSN0341	1. Mechatronics and Control Systems 2. Compressor Refrigeration Systems 3. Cryogenics	1
MSN0614 MSN0121	1. Modelling and Optimisation 2. Absorption Refrigeration	2

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

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

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