

PROGRAMME OF STUDIES

FACULTY: MECHANICAL AND POWER ENGINEERING

MAIN FIELD OF STUDY: MECHANICAL ENGINEERING AND MACHINE BUILDING

in area of technical science

EDUCATION LEVEL: 1st level, Engineer

FORM OF STUDIES: full-time

PROFILE: general academic

SPECIALIZATION: **THERMAL ENGINEERING**

LANGUAGE OF STUDY: polish

Content:

1. Plan of studies – attachment no. 1

PROGRAMME OF STUDIES

1. Description

<i>Number of semesters: 7</i>	<i>Number ECTS points necessary to obtain qualifications: 210</i>
<i>Prerequisites (particularly for second-level studies): matriculation examination in the following subjects: mathematics, physics and foreign language.</i>	<i>Upon completion of studies graduate obtains professional degree of: inżynier 1st level qualifications</i>
<i>Possibility of continuing studies: 2nd level studies</i>	<i>Graduate profile, employability: Has knowledge of engineering and design using computer techniques. Knows a foreign language at the B2 level. It is prepared to work in companies engaged in the production and operation of machinery, design and construction units and other units of the economic, administrative and educational requiring technical and computer science knowledge and information technology. Has the necessary knowledge and skills to perform engineering tasks in factories of power engineering , refrigeration, chemical, food and other, particularly in the field of thermal-flow processes.</i>
<i>Indicate connection with University's mission and its development strategy:</i>	<i>The curriculum is consistent with the mission of the university in the transfer of knowledge and skills to maintain high quality of education and realized one of the strategic objectives of which is to develop graduate profile for civil society.</i>

2. Fields of science and scientific disciplines to which educational effects apply: Technical Sciences

3. Concise analysis of consistency between assumed educational effects and labor market needs:

Expected learning outcomes to ensure the achievement of knowledge and skills in mathematics, physics and chemistry of applied then to the knowledge and technical skills including social competences. The curriculum equips graduates with the attributes enabling him to adapt to the rapidly changing requirements of the labor market.

4. List of education modules:

4.1. List of obligatory modules:

4.1.1. List of general education modules

4.1.1.1. Liberal-managerial subjects module (min. 2 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	PRZ1152	Intellectual and Industrial Property Protection	2					K1MBM_W16	30	60	2	1	T	Z	O		KO	Ob
		Total	2						30	60	2	1						

4.1.1.2. Information Technologies module (min. 4 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	INN1004	Information Technologies	2					K1MBM_W08	30	60	2	1	T	Z	O		KO	Ob
2	INN1003	Application Packages			2			K1MBM_U08	30	60	2	1,5	T	Z	O	P	KO	Ob
		Total	2		2				60	120	4	2,5						

Altogether for general education modules:

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 ¹
lec	cl	lab	pr	sem				
4		2			90	180	6	3,5

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

²Traditional – enter T, remote – enter Z

³Exam – 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)

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

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

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

⁷ Optional – enter W, obligatory – enter Ob

4.1.2. List of basic sciences modules

4.1.2.1. Mathematics module

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MAT1415	Mathematical Analysis 1A	2					K1MBM_W02 K1MBM_K01	30	150	5	2,5	T	E	O		PD	Ob
2	MAT1415	Mathematical Analysis 1A		2				K1MBM_U02 K1MBM_K01	30	90	3	2,25	T	Z	O	P	PD	Ob
3	MAT1408	Algebra and Analytic Geometry	2					K1MBM_W01 K1MBM_K01	30	60	2	1	T	E	O		PD	Ob
4	MAT1408	Algebra and Analytic Geometry		1				K1MBM_U01 K1MBM_K01	15	60	2	1,5	T	Z	O	P	PD	Ob
5	MAT1425	Mathematical Analysis 2.2A	3					K1MBM_W02 K1MBM_K01	45	150	5	2,5	T	E	O		PD	Ob
6	MAT1425	Mathematical Analysis 2.2A		2				K1MBM_U02 K1MBM_K01	30	90	3	2,25	T	Z	O	P	PD	Ob
Total			7	5					180	600	20	12						

4.1.2.2. Physics module

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	FZP1065	Physics 1.6	2					K1MBM_W03 K1MBM_K01 K1MBM_K03 K1MBM_K04	30	90	3	1,5	T	E	O		PD	Ob
2	FZP1065	Physics 1.6		2				K1MBM_U03 K1MBM_K01 K1MBM_K03 K1MBM_K04	30	60	2	1,5	T	Z	O	P	PD	Ob

¹BK – liczba punktów ECTS przypisanych godzinom zajęć wymagających bezpośredniego kontaktu nauczycieli i studentów

²Tradycyjna – T, zdalna – Z

³Egzamin – E, zaliczenie na ocenę – Z. W grupie kursów po literze E lub Z w nawiasie wpisać formę kursu końcowego (w, c, l, s, p)

⁴Kurs/ grupa kursów Ogólnouczelniany – O

⁵Kurs/ grupa kursów Praktyczny – P. W grupie kursów w nawiasie wpisać liczbę punktów ECTS dla kursów o charakterze praktycznym

⁶KO - kształcenia ogólnego, PD – podstawowy, K – kierunkowy, S – specjalnościowy

⁷W - wybieralny, Ob – obowiązkowy

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
3	FZP1066	Physics 2.11	2					K1MBM_W03 K1MBM_K01 K1MBM_K03 K1MBM_K04	30	90	3	1,5	T	E	O		PD	Ob
4	FZP1066	Physics 2.11			2			K1MBM_U03 K1MBM_K01 K1MBM_K03 K1MBM_K04	30	60	2	1,5	T	Z	O	P	PD	Ob
Total			4	2	2				120	300	10	6						

4.1.2.3. Chemistry module

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	CHC1101	Chemistry	2					K1MBM_W04	30	90	3	1,5	T	Z	O		PD	Ob
2	CHC1101	Chemistry			1			K1MBM_U04	15	30	1	0,75	T	Z	O	P	PD	Ob
Total			2		1				45	120	4	2,25						

Altogether for basic sciences modules:

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 ¹
lec	cl	lab	pr	sem				
13	7	3			345	1020	34	20,25

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

²Traditional – enter T, remote – enter Z

³Exam – 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)

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

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

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

⁷Optional – enter W, obligatory – enter Ob

4.1.3. List of main-field-of-study modules

4.1.3.1. Obligatory main-field-of-study module

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MSN0371	Theory of Machines	2					K1MBM_W13	30	60	2	1	T	Z			K	Ob
2	MSN0230	Descriptive Geometry	2					K1MBM_W07	30	60	2	1	T	Z			K	Ob
3	MSN0230	Descriptive Geometry		1				K1MBM_U07	15	30	1	0,75	T	Z		P	K	Ob
4	MSN0971	Technical Drawing				2		K1MBM_U07	30	90	3	2,25	T	Z		P	K	Ob
5	MSN0815	Basics of Metrology and Experiment Techniques	2					K1MBM_W10	30	60	2	1	T	Z			K	Ob
6	MSN0815	Basics of Metrology and Experiment Techniques		1				K1MBM_U10	15	30	1	0,75	T	Z		P	K	Ob
7	MSN0815	Basics of Metrology and Experiment Techniques			1			K1MBM_U10	15	30	1	0,75	T	Z		P	K	Ob
8	MSN0430	Mechanics 1	1					K1MBM_W05	15	30	1	0,5	T	Z			K	Ob
9	MSN0430	Mechanics 1		1				K1MBM_U05	15	30	1	0,75	T	Z		P	K	Ob
10	MSN0450	Mechanics 2	2					K1MBM_W05	30	90	3	1,5	T	E			K	Ob
11	MSN0450	Mechanics 2		1				K1MBM_U05	15	30	1	0,75	T	Z		P	K	Ob
12	MSN0770	Fundamentals of Materials Science	2					K1MBM_W06	30	90	3	1,5	T	E			K	Ob
13	MSN0400	Materials Science	1					K1MBM_W06	15	30	1	0,5	T	Z			K	Ob
14	MSN0400	Materials Science			1			K1MBM_U06 K1MBM_K03 K1MBM_K06	15	30	1	0,75	T	Z		P	K	Ob
15	MSN0820	Fundamental Strength of Materials	2					K1MBM_W05 K1MBM_K02 K1MBM_K04	30	60	2	1	T	Z			K	Ob
16	MSN0820	Fundamental Strength of Materials		1				K1MBM_U05 K1MBM_K02 K1MBM_K04	15	30	1	0,75	T	Z		P	K	Ob
17	MSN1100	Production Technics	3					K1MBM_W11	45	90	3	1,5	T	Z			K	Ob
18	MSN1080	Production Technics			2			K1MBM_U11	30	60	2	1,5	T	Z		P	K	Ob
19	MSN0570	Workshop Metrology	1					K1MBM_W11	15	30	1	0,5	T	Z			K	Ob
20	MSN0570	Workshop Metrology			1			K1MBM_U11 K1MBM_K01 K1MBM_K03	15	30	1	0,75	T	Z		P	K	Ob
21	MSN0780	Fundamentals of Fluid Mechanics	2					K1MBM_W09	30	60	2	1	T	Z			K	Ob
22	MSN0780	Fundamentals of Fluid Mechanics		1				K1MBM_U09	15	30	1	0,75	T	Z		P	K	Ob
23	MSN0810	Basics of Thermodynamics	2					K1MBM_W09	30	60	2	1	T	Z			K	Ob
24	MSN0810	Basics of Thermodynamics		1				K1MBM_U09	15	30	1	0,75	T	Z		P	K	Ob

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

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

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

⁷Optional – 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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
25	MSN1010	Combustion and Fuels	2					K1MBM_W15	30	90	3	1,5	T	E			K	Ob
26	MSN1010	Combustion and Fuels			1			K1MBM_U14	15	30	1	0,75	T	Z		P	K	Ob
27	MSN0710	Fundamentals of Control Systems	2					K1MBM_W12	30	90	3	1,5	T	E			K	Ob
28	MSN0710	Fundamentals of Control Systems		1				K1MBM_U12	15	30	1	0,75	T	Z		P	K	Ob
29	MSN0710	Fundamentals of Control Systems			2			K1MBM_U12	30	60	2	1,5	T	Z		P	K	Ob
30	MSN0740	Fundamentals of Electronics	1					K1MBM_W12	15	30	1	0,5	T	Z			K	Ob
31	MSN0740	Fundamentals of Electronics			1			K1MBM_U12	15	30	1	0,75	T	Z		P	K	Ob
32	MSN0750	Fundamentals of Electrical Engineering	2					K1MBM_W12	30	60	2	1	T	Z			K	Ob
33	MSN0750	Fundamentals of Electrical Engineering		1				K1MBM_U12	15	30	1	0,75	T	Z		P	K	Ob
34	MSN0750	Fundamentals of Electrical Engineering			1			K1MBM_U12	15	30	1	0,75	T	Z		P	K	Ob
35	MSN0680	Basics of Machine Design I	2					K1MBM_W14	30	60	2	1	T	Z			K	Ob
36	MSN0680	Basics of Machine Design I				2		K1MBM_U13	30	60	2	1,5	T	Z		P	K	Ob
37	MSN0690	Basics of Machine Design II	2					K1MBM_W14	30	90	3	1,5	T	E			K	Ob
38	MSN0690	Basics of Machine Design II				2		K1MBM_U13	30	60	2	1,5	T	Z		P	K	Ob
39	MSN0091	CAD I			2			K1MBM_U07	30	60	2	1,5	T	Z		P	K	Ob
40	MSN0100	CAD II			2			K1MBM_U07	30	60	2	1,5	T	Z		P	K	Ob
41	MSN0210	Ecology	2					K1MBM_W17 K1MBM_K02	30	90	3	1,5	T	Z			K	Ob
42	MSN1500	Environmental Management	2					K1MBM_W17 K1MBM_K02	30	90	3	1,5	T	Z			K	Ob
43	MSN1551	Engineer Diploma Seminar					1	K1MBM_U16 K1MBM_U17 K1MBM_K01 K1MBM_K03	15	30	1	0,75	T	Z		P	K	Ob
Total			37	9	14	6	1		1005	2250	75	45,25						

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

²Traditional – enter T, remote – enter Z

³Exam – 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)

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

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

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

⁷Optional – enter W, obligatory – enter Ob

4.1.3.2. Obligatory main-field-of-study module (optionally in English)

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MSN0781	Fundamentals of Fluid Mechanics	2					K1MBM_W09	30	60	2	1,00	T	Z			K	Ob
2	MSN0781	Fundamentals of Fluid Mechanics		1				K1MBM_U09	15	30	1	0,75	T	Z		P	K	Ob
3	MSN0811	Basics of Thermodynamics	2					K1MBM_W09	30	60	2	1,00	T	Z			K	Ob
4	MSN0811	Basics of Thermodynamics		1				K1MBM_U09	15	30	1	0,75	T	Z		P	K	Ob
5	MSN1011	Combustion and Fuels	2					K1MBM_W15	30	90	3	1,50	T	E			K	Ob
6	MSN1011	Combustion and Fuels			1			K1MBM_U14	15	30	1	0,75	T	Z		P	K	Ob
7	MSN0712	Fundamentals of Control Systems	2					K1MBM_W12	30	90	3	1,50	T	E			K	Ob
8	MSN0712	Fundamentals of Control Systems		1				K1MBM_U12	15	30	1	0,75	T	Z		P	K	Ob
9	MSN0741	Fundamentals of Electronics	1					K1MBM_W12	15	30	1	0,50	T	Z			K	Ob
10	MSN0741	Fundamentals of Electronics			1			K1MBM_U12	15	30	1	0,75	T	Z		P	K	Ob
11	MSN0751	Fundamentals of Electrical Engineering	2					K1MBM_W12	30	60	2	1,00	T	Z			K	Ob
12	MSN0751	Fundamentals of Electrical Engineering		1				K1MBM_U12	15	30	1	0,75	T	Z		P	K	Ob
13	MSN0681	Basics of Machine Design I	2					K1MBM_W14	30	60	2	1,00	T	Z			K	Ob
14	MSN0681	Basics of Machine Design I				2		K1MBM_U13	30	60	2	1,50	T	Z		P	K	Ob
15	MSN0691	Basics of Machine Design II	2					K1MBM_W14	30	90	3	1,50	T	E			K	Ob
16	MSN0691	Basics of Machine Design II				2		K1MBM_U13	30	60	2	1,50	T	Z		P	K	Ob

Altogether for main-field-of-study modules:

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 ¹
lec	cl	lab	pr	sem				
37	9	14	6	1	1005	2250	75	45,25

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

²Traditional – enter T, remote – enter Z

³Exam – 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)

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

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

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

⁷Optional – enter W, obligatory – enter Ob

4.2. List of optional modules:

4.2.1 List of general education modules

4.2.1.1. Liberal-managerial subjects module (min.5 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	HSN100300BK	Humanities	2					K1MBM_W18 K1MBM_K06 K1MBM_K07	30	60	2	1	T	Z	O		KO	W
2	HSN100300BK	Humanities	1					K1MBM_W18 K1MBM_K06 K1MBM_K07	15	60	2	1	T	Z	O		KO	W
3	ZSN100300BK	Management Science	1					K1MBM_W18 K1MBM_K06	15	30	1	0,5	T	Z	O		KO	W
Total			4						60	150	5	2,5						

4.2.1.2. Foreign languages module (min.5 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	JZL100707	Foreign Language B2.1		4				K1MBM_U15	60	60	2	1,5	T	Z	O	P	KO	W
2	JZL100708	Foreign Language B2.2		4				K1MBM_U15	60	90	3	2,25	T	Z	O	P	KO	W
Total				8					120	150	5	3,75						

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

²Traditional – enter T, remote – enter Z

³Exam – 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)

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

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

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

⁷ Optional – enter W, obligatory – enter Ob

4.2.1.3. Sporting classes module (min. 0 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	WFW00000BK	Sporting Classes		2				K1MBM_K07	30	0	0	0	T	Z	O	P	KO	W
		Total		2					30	0	0	0						

Altogether for general education modules:

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 ¹
lec	cl	lab	pr	sem				
4	10				210	330	11	7,25

4.2.2. List of main-field-of-study modules

4.2.2.1. Advanced design methods module (min. 3 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
		Advanced Design Methods:			2			30	90	3	2,25	T	Z		P	K	W	
	MSN0111	CATIA					K1MBM_U08											
	MSN1001	Solid Edge					K1MBM_U07											
	MSN0236	3D Graphic					K1MBM_U07 K1MBM_K06											
		Total			2			30	90	3	2,25							

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

²Traditional – enter T, remote – enter Z

³Exam – 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)

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

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

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

⁷Optional – enter W, obligatory – enter Ob

4.2.2.2. Engineer individual student project module (min. 3 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MSN1521	Engineer Individual Student Project				4		K1MBM_U17 K1MBM_K04 K1MBM_K05	60	90	3	1	T	Z		P	K	W
		Total				4			60	90	3	1						

4.2.2.3. Professional practice module (min. 4 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MSN1590	Professional Practice						K1MBM_K01 K1MBM_K03 K1MBM_K04 K1MBM_K05		120	4	0	T	Z		P	K	W
		Total								120	4	0						

4.2.2.4. Engineer thesis module (min. 15 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MSN1600	Engineer Thesis						K1MBM_U17 K1MBM_K04 K1MBM_K05		450	15	2	T	Z		P		W
		Total								450	15	2						

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³Exam – 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)

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

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

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

⁷ Optional – enter W, obligatory – enter Ob

Altogether for main-field-of-study modules:

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 ¹
lec	cl	lab	pr	sem				
		2	4		90	750	25	5,25

4.2.3. List of specialization modules

4.2.3.1. Specialization subjects module (min. 60 ECTS points):

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MSN1460	Strength of Materials	2					S1INC_W01 K1MBM_K02 K1MBM_K04	30	90	3	1,50	T	E			S	W
2	MSN1460	Strength of Materials		1				S1INC_U01 K1MBM_K02 K1MBM_K04	15	30	1	0,75	T	Z		P	S	W
3	MSN1460	Strength of Materials			1			S1INC_U01 K1MBM_K02 K1MBM_K04	15	30	1	0,75	T	Z		P	S	W
4	MSN1170	Theory of Thermal Machines	1					S1INC_W02	15	60	2	1,00	T	E			S	W
5	MSN1170	Theory of Thermal Machines		2				S1INC_U02	30	60	2	1,50	T	Z		P	S	W
6	MSN1070	Technical Fluid Mechanics	2					S1INC_W03	30	90	3	1,50	T	E			S	W
7	MSN1070	Technical Fluid Mechanics		1				S1INC_U03	15	30	1	0,75	T	Z		P	S	W
8	MSN1400	Heat Transfer and Heat Exchangers	2					S1INC_W04	30	60	2	1,00	T	Z			S	W
9	MSN1400	Heat Transfer and Heat Exchangers		1				S1INC_U04	15	30	1	0,75	T	Z		P	S	W
10	MSN1210	Thermodynamics – laboratory			2			S1INC_U05	30	60	2	1,50	T	Z		P	S	W
11	MSN0500	Fluid Mechanics – laboratory			2			S1INC_U03	30	60	2	1,50	T	Z		P	S	W
12	MSN0140	Refrigeration and Cryogenics	2					S1INC_W05	30	90	3	1,50	T	E			S	W
13	MSN0140	Refrigeration and Cryogenics		1				S1INC_U06	15	30	1	0,75	T	Z		P	S	W
14	MSN0170	Thermal Fluid–flow Machinery	2					S1INC_W06	30	60	2	1,00	T	Z			S	W
15	MSN0170	Thermal Fluid–flow Machinery		1				S1INC_U07	15	30	1	0,75	T	Z		P	S	W
16	MSN0841	Pumps	2					S1INC_W07	30	60	2	1,00	T	Z			S	W
17	MSN0841	Pumps		1				S1INC_U08	15	30	1	0,75	T	Z		P	S	W
18	MSN0262	Process Engineering and Apparatus	2					S1INC_W08	30	90	3	1,50	T	E			S	W
19	MSN0262	Process Engineering and Apparatus		2				S1INC_U09	30	60	2	1,50	T	Z		P	S	W
20	MSN1030	Fans and Compressors	1					S1INC_W07	15	30	1	0,50	T	Z			S	W
21	MSN1030	Fans and Compressors		1				S1INC_U08	15	30	1	0,75	T	Z		P	S	W
22	MSN0931	Nuclear Reactors	1					S1INC_W09	15	30	1	0,50	T	Z			S	W
23	MSN0931	Nuclear Reactors			1			S1INC_U10	15	30	1	0,75	T	Z		P	S	W
24	MSN1340	Boiler Devices	2					S1INC_W10	30	90	3	1,50	T	E			S	W
25	MSN1340	Boiler Devices				2		S1INC_U11	30	60	2	1,50	T	Z		P	S	W

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³Exam – 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)

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

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

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

⁷ 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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
26	MSN1350	Air Protection Installations	2					S1INC_W11	30	60	2	1,00	T	Z			S	W
27	MSN1350	Air Protection Installations				1		S1INC_U12 K1MBM_K01 K1MBM_K03	15	30	1	0,75	T	Z		P	S	W
28	MSN0060	Research and Testing of Machines	2					S1INC_W12	30	90	3	1,50	T	E			S	W
29	MSN0060	Research and Testing of Machines			2			S1INC_U13	30	60	2	1,50	T	Z		P	S	W
30	MSN0392	Volumetric Machines	2					S1INC_W07	30	60	2	1,00	T	Z			S	W
31	MSN0392	Volumetric Machines		1				S1INC_U08	15	30	1	0,75	T	Z		P	S	W
32	MSN0392	Volumetric Machines				1		S1INC_U08	15	30	1	0,75	T	Z		P	S	W
33	MSN0999	Heat Power Stations	2					S1INC_W13	30	90	3	1,50	T	Z			S	W
34	MSN0993	Heat Power Stations			1			S1INC_U14	15	30	1	0,75	T	Z		P	S	W
Total			27	12	9	4			780	1800	60	36,25						

4.2.3.2. Specialization subjects module (optionally in English)

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 ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			universit y-wide ⁴	practical ⁵	kind ⁶	type ⁷
1	MSN1071	Technical Fluid Mechanics	2					S1INC_W03	30	90	3	1,50	T	E			S	W
2	MSN1071	Technical Fluid Mechanics		1				S1INC_U03	15	30	1	0,75	T	Z		P	S	W
3	MSN0141	Refrigeration and Cryogenics	2					S1INC_W05	30	90	3	1,50	T	E			S	W
4	MSN0141	Refrigeration and Cryogenics		1				S1INC_U06	15	30	1	0,75	T	Z		P	S	W
5	MSN1401	Heat Transfer and Heat Exchangers	2					S1INC_W04	30	60	2	1,00	T	Z			S	W
6	MSN1401	Heat Transfer and Heat Exchangers		1				S1INC_U04	15	30	1	0,75	T	Z		P	S	W

Altogether for specialization modules:

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 ¹
lec	cl	lab	pr	sem				
27	12	9	4		780	1800	60	36,25

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

²Traditional – enter T, remote – enter Z

³Exam – 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)

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

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

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

⁷ Optional – enter W, obligatory – enter Ob

4.3. Training module (Faculty Council resolution on principles of crediting training – attachment no. 1)

Name of training		Praktyka zawodowa	
Number of ECTS points	Number of ECTS points for BK classes ¹	Training crediting mode	Code
4	0	Opinion from training tutor and a report from practice	MSN1590
Training duration		Training objective	
4 weeks		<ul style="list-style-type: none"> - to familiarize with the methods of operation of equipment and production, and the procedures and methods of work organization, - to confront knowledge with the practice and - to use knowlege for solving attributed tasks 	

4.4. Diploma dissertation module

Type of diploma dissertation	inżynier	
Number of diploma dissertation semesters	Number of ECTS points	Code
1	15	MSN1600
Character of diploma dissertation		
experimental / design		
Number of BK ¹ ECTS points	2	

5. Ways of verifying assumed educational effects

Type of classes	Ways of verifying assumed educational effects
lecture	exam, progress and final test
class	progress and final tests
laboratory	pretest, report from laboratory
project	project defence

seminar	participation in discussion, topic presentation, essay
training	report from training
diploma dissertation	evaluation of diploma dissertation

6. Total number of ECTS points, which student has to obtain from classes requiring direct academic teacher-student contact (enter total of ECTS points for courses/groups of courses denoted with code BK¹)

116,75 ECTS points

7. Total number of ECTS points, which student has to obtain from basic sciences classes

Number of ECTS points for obligatory subjects.	34
Number of ECTS points for optional subjects	0
Total number of ECTS points	34

8. Total number of ECTS points, which student has to obtain from practical classes, including laboratory classes (enter total number of ECTS points for courses/group of courses denoted with code P)

Number of ECTS points for obligatory subjects Including laboratory classes and project	26	46
Number of ECTS points for optional subjects Including: laboratory classes and project diploma dissertation	19 15	55
Total number of ECTS points		101

9. Minimum number of ECTS points, which student has to obtain doing education modules offered as part of university-wide classes or other main field of study (enter number of ECTS points for courses/groups of courses denoted with code O)

50 ECTS points

10. Total number of ECTS points, which student may obtain doing optional modules (min. 30% of total number of ECTS points)

95 ECTS points (45,2%)

11. Range of the diploma exam

1. Theoretical problems

- 1.1. Podstawowe równania mechaniki płynów – zasada zachowania masy, pędu i energii
- 1.2. Równanie Bernoulliego dla płynu doskonałego i jego zastosowanie
- 1.3. Przepływy laminarne i turbulenty. Rozkłady prędkości przepływu w przewodzie.
- 1.4. Charakterystyka przepływu w pojedynczym przewodzie i szeregowym systemie hydraulicznym. Rozkład energii wzdłuż rurociągu – wykres Ancony
- 1.5. Pierwsza i druga zasada termodynamiki (entropia, zjawiska odwracalne i nieodwracalne)
- 1.6. Przemiany charakterystyczne gazu doskonałego. Równanie stanu gazu. Gaz wilgotny
- 1.7. Przemiany charakterystyczne pary wodnej (układ p-v, T-s oraz i-s)
- 1.8. Przewodzenie i przenikanie ciepła. Promieniowanie cieplne – podstawowe prawa. Rodzaje wymiany ciepła – podstawowe równania je opisujące
- 1.9. Sprężanie gazów, określenie sprawności sprężania, poprawa sprawności obiegu
- 1.10. Spalanie paliw stałych, ciekłych i gazowych - specyfika spalania, stechiometria

2. Construction and technological problems

- 2.1. Obieg Clausiusa – Rankine’a, metody podwyższenia sprawności obiegu C-R
- 2.2. Obiegi ziębnicze i obiegi kriogeniczne
- 2.3. Podstawy procesów inżynierii chemicznej: destylacja i rektyfikacja, absorpcja i desorpcja, ekstrakcja, adsorpcja
- 2.4. Analiza procesu sprężania w sprężarce wielostopniowej
- 2.5. Wymienniki ciepła w procesach przemysłowych (rodzaje, budowa, zasada pracy, zastosowania)
- 2.6. Kotły rusztowe w energetyce cieplnej - wodne i parowe
- 2.7. Kotły parowe dużej wydajności- podział kotłów ze względu na konstrukcję komory paleniskowej i parametry pracy
- 2.8. Turbiny parowe i gazowe– rodzaje i konstrukcje turbin, zasada działania, sprawność stopnia
- 2.9. Gazowe objętościowe maszyny energetyczne (rodzaje, budowa, zasada działania)
- 2.10. Techniki ograniczania emisji substancji zanieczyszczających do atmosfery – urządzenia i instalacje

3. Operational problems

- 3.1. Pomiary ciśnienia, temperatury i przepływu płynu
- 3.2. Oznaczanie wilgotności i gęstości gazu
- 3.3. Charakterystyki pracy wentylatora, punkt pracy, metody regulacji parametrów pracy
- 3.4. Charakterystyki pracy pompy wodnej, punkt pracy, metody regulacji parametrów pracy
- 3.5. Oddziaływanie siłowni cieplnych na środowisko (powietrze, woda, gleba)
- 3.6. Określanie sprawności eksploatacyjnej kotłów energetycznych
- 3.7. Określanie sprawności eksploatacyjnej turbin parowych
- 3.8. Problemy eksploatacyjne reaktorów jądrowych
- 3.9. Sterowanie procesami cieplnymi – regulatory PID, sterowniki PLC
- 3.10. Spalanie i współspalanie biomasy w kotłach – problemy eksploatacyjne

12. Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular modules

<i>No.</i>	<i>Course code</i>	<i>Name of course</i>	<i>Crediting by deadline of... (number of semester)</i>
	Faculty Council Resolution No 4/D/2008 of 19.09.2008	The condition for admission the student to the execution of the <i>master thesis</i> module is to pass all subjects in plan of studies in the semester prior to the semester of graduation	

13. Plan of studies (attachment no. 1)