Attachment no. 2 to Programme of Education

Attachment no. 11 to Faculty Council Resolution no. 116/15/2016-2020

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: **ENGINEERING OF AVIATION**

LANGUAGE OF STUDY: polish

Content:

1. Plan of studies – attachment no. 1

Faculty Council Resolution of 20.09.2017

In effect since 01.10.2017

PROGRAMME OF STUDIES

1. Description

Number of semesters: 7	*Number ECTS points necessary to obtain qualifications:* 210
Prerequisites (particularly for second-level studies): matriculation examination in the following subjects: mathematics, physics and foreign language.	*Upon completion of studies graduate obtains professional degree of:* inżynier 1st level qualifications
Possibility of continuing studies: 2nd level studies	*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 in the construction and operation of aircraft. It is prepared to perform engineering tasks in factories aviation industry and in aircraft operators.
Indicate connection with University's mission and its development strategy:	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.

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

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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]			university-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]			university-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

[1]BK – liczba punktów ECTS przypisanych godzinom zajęć wymagających bezpośredniego kontaktu nauczycieli i studentów
[2]Tradycyjna – T, zdalna – Z
[3]Egzamin – E, zaliczenie na ocenę – Z. W grupie kursów po literze E lub Z w nawiasie wpisać formę kursu końcowego (w, c, l, s, p)
[4]Kurs/ grupa kursów Ogólnouczelniany – O
[5]Kurs/ grupa kursów Praktyczny – P. W grupie kursów w nawiasie wpisać liczbę punktów ECTS dla kursów o charakterze praktycznym
[6]KO - kształcenia ogólnego, PD – podstawowy, K – kierunkowy, S – specjalnościowy
[7]W - 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]			university-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]			university-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

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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

4.1.3. 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]			university-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

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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]			university-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						

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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

4.1.3.2. *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

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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. 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]			university-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]			university-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						

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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	WFW000000BK	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	300	10	6,25

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						

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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

4.2.2.2. *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]			university-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]			university-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]			university-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						

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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]			university-wide[4]	practical[5]	kind[6]	type[7]
1	MSN1430	Strength of Aircraft Structures	2					S1ILO_W01	30	90	3	1,5	T	E			S	W
2	MSN1430	Strength of Aircraft Structures		2				S1ILO_U01	30	60	2	1,5	T	Z		P	S	W
3	MSN1190	Theory of Aircraft Propulsion	2					S1ILO_W02	30	90	3	1,5	T	E			S	W
4	MSN1190	Theory of Aircraft Propulsion		1				S1ILO_U02	15	30	1	0,75	T	Z		P	S	W
5	MSN0020	Aerodynamics	2					S1ILO_W03	30	90	3	1,5	T	E			S	W
6	MSN0020	Aerodynamics		1				S1ILO_U03	15	30	1	0,75	T	Z		P	S	W
7	MSN0020	Aerodynamics			1			S1ILO_U04	15	30	1	0,75	T	Z		P	S	W
8	MSN0360	Aviation Machines and Electric Devices	2					S1ILO_W04	30	60	2	1	T	Z			S	W
9	MSN0900	Designing of Aeroplanes	2					S1ILO_W05	30	60	2	1	T	Z			S	W
10	MSN0900	Designing of Aeroplanes				2		S1ILO_U05	30	60	2	1,5	T	Z		P	S	W
11	MSN1250	Aero-piston Engines	2					S1ILO_W06	30	90	3	1,5	T	E			S	W
12	MSN1250	Aero-piston Engines		1				S1ILO_U06	15	30	1	0,75	T	Z		P	S	W
13	MSN0052	Avionics and Control of Aircrafts	2					S1ILO_W07	30	60	2	1	T	Z			S	W
14	MSN0052	Avionics and Control of Aircrafts				1		S1ILO_U07	15	30	1	0,75	T	Z		P	S	W
15	MSN0481	Flight Mechanics	1					S1ILO_W08	15	60	2	1	T	E			S	W
16	MSN0481	Flight Mechanics		1				S1ILO_U09	15	30	1	0,75	T	Z		P	S	W
17	MSN0481	Flight Mechanics				1		S1ILO_U10	15	30	1	0,75	T	Z		P	S	W
18	MSN1420	Equipment of Aircrafts	2					S1ILO_W09	30	60	2	1	T	Z			S	W
19	MSN1420	Equipment of Aircrafts			2			S1ILO_U11	30	60	2	1,5	T	Z		P	S	W
20	MSN0321	Constructing of Aeroplanes	1					S1ILO_W10	15	60	2	1	T	E			S	W
21	MSN0321	Constructing of Aeroplanes		1				S1ILO_U12	15	30	1	0,75	T	Z		P	S	W
22	MSN0321	Constructing of Aeroplanes				2		S1ILO_U13	30	60	2	1,5	T	Z		P	S	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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]			university-wide[4]	practical[5]	kind[6]	type[7]
23	MSN1300	Gas Turbine Engines	2					S1ILO_W11	30	90	3	1,5	T	E			S	W
24	MSN1300	Gas Turbine Engines		1				S1ILO_U14	15	30	1	0,75	T	Z		P	S	W
25	MSN0190	Diagnostics of Aviation Equipment	2					S1ILO_W12	30	60	2	1	T	Z			S	W
26	MSN0190	Diagnostics of Aviation Equipment			2			S1ILO_U15	30	60	2	1,5	T	Z		P	S	W
27	MSN1131	Technology of Development and Repair	1					S1ILO_W13	15	30	1	0,5	T	Z			S	W
28	MSN1131	Technology of Development and Repair			1			S1ILO_U16	15	30	1	0,75	T	Z		P	S	W
29	MSN1060	Helicopters	2					S1ILO_W14	30	60	2	1	T	Z			S	W
30	MSN0732	Bases of Aircraft Operation	2					S1ILO_W15	30	60	2	1	T	Z			S	W
31	MSN0732	Bases of Aircraft Operation			1			S1ILO_U17	15	30	1	0,75	T	Z		P	S	W
32	MSN0732	Bases of Aircraft Operation					1	S1ILO_U18	15	30	1	0,75	T	Z		P	S	W
33	MSN0187	Human Factors in Aircraft Maintenance	1					S1ILO_W16	15	60	2	1	T	Z			S	W
34	MSN0187	Human Factors in Aircraft Maintenance					2	S1ILO_U19	30	60	2	1,5	T	Z		P	S	W
		Total	28	8	7	6	3		780	1800	60	36						

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				
26	8	8	7	3	780	1800	60	36

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]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)
[4]University-wide course /group of courses – enter O
[5]Practical 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	- 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 BK[1]) **117 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	46
Including laboratory classes and project	26
Number of ECTS points for optional subjects	54
Including:	
laboratory classes and project	19
diploma dissertation	15
Total number of ECTS points	100

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. Charakterystyka obciążeń zewnętrznych płatowca
1.3. Charakterystyka wytrzymałościowa powłok cienkościennych
1.4. Równanie Bernouliego. Parametry krytyczne gazu
1.5. Warstwa graniczna, charakterystyka przepływu gazu
1.6. Siły aerodynamiczne działające na samolot i czynniki na nie wpływające

1.7. Doskonałość aerodynamiczna i czynniki wpływające na jej wielkość
1.8. Pierwsza i druga zasad termodynamiki (entropia, zjawiska odwracalne i nieodwracalne)
1.9. Interpretacja równań ruchu podczas wykonywania lotów ustalonych samolotu
1.10. Stateczność i sterowność samolotu
1.11. Obieg porównawczy i rzeczywisty silnika tłokowego
1.12. Parametry indykowane i efektywne lotniczego silnika tłokowego
1.13. Obieg porównawczy i rzeczywisty silnika turbinowego, parametry obiegu
1.14. Wloty powietrza do turbinowych silników lotniczych
1.15. Zasada działania stopnia promieniowego i osiowego sprężarki lotniczego silnika turbinowego
1.16. Działanie komór spalania silników przepływowych (stechiometria spalania, procesy zachodzące w komorze spalania, strumień pierwotny i wtórny)
1.17. Zasada działania stopnia osiowej turbiny reakcyjnej
1.18. Zasada działania oraz zakresy pracy dysz wylotowych lotniczych silników turbinowych

2. Construction and technological problems

2.1. Układy konstrukcyjne lotniczych silników tłokowych
2.2. Obciążenia działające w układzie korbowo-tłokowym oraz wyrównoważenie lotniczych silników tłokowych
2.3. Układy konstrukcyjne lotniczych silników turbinowych i ich głównych zespołów
2.4. Przeznaczenie i konstrukcja systemów pneumatycznych statków powietrznych
2.5. Przeznaczenie i konstrukcja systemów hydraulicznych statków powietrznych
2.6. Konstrukcja układu sterowania samolotu
2.7. Konstrukcyjna płatowcowych systemów paliwowych
2.8. Wytwarzanie konstrukcji integralnych i przekładkowych
2.9. Rodzaje połączeń elementów i podzespołów konstrukcyjnych płatowca
2.10. Mechanizacja skrzydła – rodzaje i wpływ na charakterystyki aerodynamiczne
2.11. Konstrukcja układu transmisji i sterowania śmigłowca
2.12. Układy olejenia silników lotniczych
2.13. Lotnicze przyrządy pilotażowe – przeznaczenie i zasada działania
2.14. Charakterystyka lotniczych przyrządów kontroli pracy silnika i instalacji statku powietrznego
2.15. Pokładowe źródła energii elektrycznej na statkach powietrznych
2.16. Systemy nawigacji statków powietrznych
2.17. Konstrukcja urządzeń specjalnych stosowanych w układach wylotowych lotniczych silników turbinowych
2.18. Właściwości materiałów konstrukcyjnych stosowanych w budowie płatowców i silników

3. Operational problems

3.1. Metody nieniszczących badań wizualnych i ich charakterystyka
3.2. Charakterystyka wiroprądowej i magnetoelektrycznej metody badań nieniszczących
3.3. Podstawowe pojęcia diagnostyki: diagnozowanie, prognozowanie, genezowanie
3.4. Próba zespołu napędowego statku powietrznego – cel wykonywania oraz zasady bezpieczeństwa
3.5. Zapobieganie uszkodzeniom lotniczych silników turbinowych przez ciała obce
3.6. Sposoby zapobiegania niestatecznej pracy sprężarki osiowej
3.7. Podstawowe charakterystyki turbinowych silników odrzutowych jedno i dwuprzepływowych (obrotowa, prędkościowa, wysokościowa).
3.8. Zasady ruchu pieszego i kołowego po lotnisku
3.9. Zasady bezpieczeństwa podczas zaopatrywania statku powietrznego w paliwo
3.10. Zasady bezpieczeństwa związane z eksploatacją urządzeń elektrycznych i elektronicznych statków powietrznych
3.11. Ruch lotniczy, urządzenia kierowania i ubezpieczenia lotów
3.12. Metody obsługi statków powietrznych – ich zalety i wady
3.13. Zasady wykonywania przeglądów statków powietrznych
3.14. Niwelacja statku powietrznego – cel i metodyka wykonywania
3.15. Ograniczenia lotne statku powietrznego
3.16. Struktura modelu SHEL i związki między jego elementami
3.17. Czynniki wpływające na ludzką wydolność
3.18. System bezpieczeństwa lotów

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

No.	*Course code*	*Name of course*	*Crediting by deadline of... (number of semester)*
Faculty Council Resolution No 4/D/2008 of 19.09.2008		The condition for admission the student to the execution of the *master thesis* 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)