PROGRAM OF STUDIES

FACULTY:	**FACULTY OF FUNDAMENTAL PROBLEMS OF TECHNOLOGY**
MAIN FIELD OF STUDY:	**MEDICAL INFORMATICS**
DISCIPLINES:	**Biomedical engineering**
EDUCATION LEVEL:	**first-level studies**
FORM OF STUDIES:	**full-time studies**
PROFILE:	**general academic**
LANGUAGE OF STUDY:	**english**
IN EFFECT SINCE:	**2023/2024**

Contents:

DESCRIPTION OF THE PROGRAM OF STUDIES

Main field of study:	Profile:
MEDICAL INFORMATICS	**GENERAL ACADEMIC**
Level of studies:	Form of studies:
FIRST-LEVEL STUDIES	**FULL-TIME STUDIES**

1 General description

1.1. Number of semesters	*1.2. Total number of ECTS points necessary to complete studies at a given level*
7	210
1.3. Total number of hours	*1.4. Prerequisites (particularly for second-level studies)*
2485	Detailed requirements are contained in the Internal Regulations "On the conditions and procedure of recruitment".
1.5. Upon completion of studies graduate obtains professional degree of	*1.6. Graduate profile, employability*
engineer	*Graduates have a broad knowledge of biomedical engineering and acquire a core competence in medical informatics, medical electronics, and biomechanics. They are prepared to design and use modern medical devices for measurement, diagnostic, and therapeutic purposes. Also, they can collect and process information as well as implement, test, and maintain eHealth solutions. Graduates can participate in research and development and can pursue graduate studies.*

	Graduates can work for: *(1) healthcare units (e.g., hospitals, outpatient clinics, clinical labs)* *(2) medical device companies* *(3) R&D companies* *(4) IT companies* *(5) schools as a teacher.*
1.7. Possibility of continuing studies	*1.8. Indicate connection with University's mission and its development strategy*
Opportunity to apply for admission to second-level studies, postgraduate studies	*The program's goals are to empower students to thrive in a rapidly changing worlds of biomedical engineering and computer technologies as well as understand the needs of patients and healthcare professionals.*

2 Detailed description

2.1 Total number of learning outcomes in the program of study:

W (knowledge) =	9
U (skills) =	14
K (competences) =	8
W + U + K =	31

2.2 For the main field of study assigned to more than one discipline - the number of learning outcomes assigned to the discipline:

D1 (major):	31	(must be greater than half the total number of learning outcomes)

2.3 For the main field of study assigned to more than one discipline - percentage share of the number of ECTS points for each discipline:

D1 (major):	100	% ECTS points

2.4 a) For the general academic profile of the main field of study – the number of ECTS points assigned to the classes related to the University's academic activity in the discipline or disciplines to which the main field of study is assigned – DN:

ECTS (DN):	133	(must be greater than 50% of the total number of ECTS points from 1.2)

b) For the practical profile of the main field of study - the number of ECTS points assigned to the classes shaping practical skills:

ECTS (P):	-	

2.5 Concise analysis of compliance of the assumed learning outcomes with the needs of the labor market:

There is a growing demand on the labor market for biomedical engineers with interdisciplinary knowledge in the field of medicine, computer science and medical equipment. Such knowledge is required by a rapidly evolving healthcare system that strives to meet the demands of patients and healthcare professionals.

2.6 The total number of ECTS points that a student must obtain in classes requiring direct participation of academic teachers or other persons conducting classes and students:

ECTS (BU):	109.65	(the sum of ECTS points for courses / groups of courses marked with the BU code)

2.7 Total number of ECTS points, which student has to obtain from basic sciences classes:

Number of ECTS points for obligatory subjects	40
Number of ECTS points for optional subjects	0
Total number of ECTS points	40

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

Number of ECTS points for obligatory subjects	79
Number of ECTS points for optional subjects	47
Total number of ECTS points	126

2.9 Minimum number of ECTS points, which student has to obtain doing education blocks 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):

ECTS (O):	15	(enter the sum of ECTS points for courses / groups of courses marked with the O code)

2.10 Total number of ECTS points, which student may obtain doing optional blocks (min. 30% of total number of ECTS points):

ECTS:	63	(must be greater than 30% of the total number of ECTS points)

3 Description of the process leading to learning outcomes acquisition:

Subject cards contain methods for checking the assumed learning outcomes (Appendix No. 2 to ZW 16/2020). Oral/written examinations, tests, presentations, and participation in group discussions are used to assess learning outcomes in knowledge. Acquired skills are assessed based on written reports and skills troubleshooting. Observation of the student's behavior during individual and group work, as well as his interaction with the teacher are used to assess social competence.

4 List of education blocks:

4.1 List of obligatory blocks

4.1.1 List of general education blocks

4.1.1.1 Information technologies block *min. 5 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Introduction to Programming	2					K1IBM_W04	30	50	2		1.28	T	Z	O			KO
2		Introduction to Programming			3			K1IBM_U04	45	75	3		1.88	T	Z	O		P	KO
		Total	2	0	3	0	0		75	125	5		3.16					3	

Altogether for general education blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes[5]	Number of ECTS points for BU classes[1]
lec	cl	lab	pr	sem	h	h	Points	Points	Points
2	0	3	0	0	75	125	5	0	3.16

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.1.2 List of basic sciences blocks

4.1.2.1 *Mathematics block* *min. 24 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes [1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Algebra and Analytic Geometry	2					K1IBM_W01 K1IBM_K01	30	75	3		1.44	T	E				PD
2		Algebra and Analytic Geometry		3				K1IBM_U10 K1IBM_K01	45	50	2		1.88	T	Z			P	PD
3		Mathematical Analysis 1	2					K1IBM_W01 K1IBM_K01	30	100	4		1.44	T	E				PD
4		Mathematical Analysis 1		3				K1IBM_U10 K1IBM_K01	45	75	3		1.88	T	Z			P	PD
5		Mathematical Analysis 2	2					K1IBM_W01 K1IBM_K01	30	75	3		1.44	T	E				PD
6		Mathematical Analysis 2		2				K1IBM_U10 K1IBM_K01	30	75	3		1.28	T	Z			P	PD
7		Statistics and Probability Theory	2					K1IBM_W01 K1IBM_U01 K1IBM_K01	30	75	3		1.44	T	E				PD
8		Statistics and Probability Theory		2				K1IBM_U05 K1IBM_U10 K1IBM_K01	30	75	3		1.28	T	Z			P	PD
		Total	8	8	0	0	0		270	600	24		12.08					11	

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.1.2.2 *Physics block* *min. 10 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Physics 1	3					K1IBM_W01 K1IBM_U06 K1IBM_K01 K1IBM_K03 K1IBM_K04	45	75	3		2.04	T	E				PD
2		Physics 1		2				K1IBM_U06 K1IBM_U10 K1IBM_K01 K1IBM_K03 K1IBM_K04	30	50	2		1.28	T	Z			P	PD
3		Physics 2	2					K1IBM_W01 K1IBM_K01 K1IBM_K03 K1IBM_K04	30	50	2		1.44	T	E				PD
4		Physics 2			3			K1IBM_U09 K1IBM_K01 K1IBM_K03 K1IBM_K04	45	50	2		1.88	T	Z			P	PD
5		Physics 2		1				K1IBM_U09 K1IBM_K01 K1IBM_K03 K1IBM_K04	15	25	1		0.68	T	Z			P	PD
		Total	5	3	3	0	0		165	250	10		7.32					5	

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.1.2.3 *Chemistry block* *min. 6 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Principles of Chemistry	1					K1IBM_W01	15	50	2		0.68	T	Z				PD
2		Principles of Chemistry		2				K1IBM_W01 K1IBM_U10 K1IBM_K01	30	50	2		1.28	T	Z			P	PD
3		Principles of Organic Chemistry	2					K1IBM_W01	30	50	2		1.28	T	Z				PD
		Total	3	2	0	0	0		75	150	6		3.24					2	

Altogether for basic sciences blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes[5]	Number of ECTS points for BU classes[1]
lec	cl	lab	pr	sem	h	h	Points	Points	Points
16	13	3	0	0	510	1000	40	0	22.64

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.1.3 List of the main field of study blocks

4.1.3.1 Obligatory main field of study blocks *min. 117 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide[4]	Concerning scientific activities[5]	Practical[6]	Type[7]
1		Anatomy for Biomedical Engineers	2					K1IBM_W02 K1IBM_U06 K1IBM_K03	30	50	2		1.28	T	Z				K
2		Introduction to Medical Electronics	2					K1IBM_W03 K1IBM_U01 K1IBM_K01	30	50	2		1.28	T	Z				K
3		Medical Electronics 2	2					K1IBM_W03 K1IBM_W04	30	50	2		1.28	T	Z				K
4		Medical Electronics 2		1				K1IBM_W09 K1IBM_U10 K1IBM_K02	15	25	1	1	0.68	T	Z		DN	P	K
5		Medical Electronics 2			2			K1IBM_W09 K1IBM_U10 K1IBM_K02	30	50	2	2	1.28	T	Z		DN	P	K
6		Introduction to Object Oriented Programming	2					K1IBM_W03 K1IBM_W10	30	75	3	3	1.44	T	E		DN		K
7		Introduction to Object Oriented Programming			4			K1IBM_U04 K1IBM_W10	60	75	3	3	2.48	T	Z		DN	P	K
8		Propaedeutics of Medical Sciences	2					K1IBM_W02 K1IBM_K03	30	50	2	2	1.28	T	Z		DN		K
9		Introduction to Optics and Biophotonics	2					K1IBM_W03	30	50	2	2	1.28	T	Z		DN		K
10		Introduction to Optics and Biophotonics					1	K1IBM_U06 K1IBM_U09	15	25	1	1	0.68	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

11		Databases	2					K1IBM_W08 K1IBM_W10	30	75	3	3	1.44	T	E		DN		K
12		Databases			2			K1IBM_U04 K1IBM_U08 K1IBM_U13	30	75	3	3	1.28	T	Z		DN	P	K
13		Microcontrollers	1					K1IBM_W03 K1IBM_K01	15	30	1	1	0.68	T	Z		DN		K
14		Microcontrollers			3			K1IBM_W03 K1IBM_U05 K1IBM_K02	45	50	2	2	1.88	T	Z		DN	P	K
15		Mobile Application Development	2					K1IBM_W08 K1IBM_W10	30	50	2	2	1.28	T	Z		DN		K
16		Mobile Application Development			2			K1IBM_U04 K1IBM_U08 K1IBM_U13	30	50	2	2	1.28	T	Z		DN	P	K
17		Introduction to Optics and Biophotonics			1			K1IBM_U11	15	25	1		0.68	T	Z			P	K
18		Introduction to Physiology	1					K1IBM_W02 K1IBM_K01 K1IBM_K05	15	25	1	1	0.68	T	Z		DN		K
19		Programming in Python			3			K1IBM_U04	45	75	3	3	1.88	T	Z		DN	P	K
20		Biochemistry	2					K1IBM_W01 K1IBM_W03	30	50	2	2	1.44	T	E		DN		K
21		Biophysics	1					K1IBM_W03	15	25	1		0.68	T	Z				K
22		Biophysics		1				K1IBM_U09	15	50	2		0.68	T	Z			P	K
23		Biophysics			1			K1IBM_U09 K1IBM_U10 K1IBM_K01 K1IBM_K03	15	50	2		0.68	T	Z			P	K
24		Electromedical Instrumentation	2					K1IBM_W03 K1IBM_W04 K1IBM_K01	30	50	2	2	1.28	T	Z		DN		K
25		Electromedical Instrumentation			1			K1IBM_U08	15	50	2	2	0.68	T	Z		DN	P	K
26		Network Technologies	2					K1IBM_W08 K1IBM_W10	30	75	3	3	1.44	T	E		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

27		Network Technologies			2			K1IBM_U04 K1IBM_U08 K1IBM_U13	30	75	3	3	1.28	T	Z		DN	P	K
28		Digital Signal Processing	2					K1IBM_W03 K1IBM_K01	30	50	2	2	1.44	T	E		DN		K
29		Digital Signal Processing			2			K1IBM_U05 K1IBM_U10 K1IBM_K01	30	75	3	3	1.28	T	Z		DN	P	K
30		Software Engineering (GK)	2					K1IBM_W08	30	75	3	3	1.44	T	E		DN		K
31		Software Engineering (GK)			2			K1IBM_U13 K1IBM_K03 K1IBM_K04 K1IBM_K05	30	75	3	3	1.28	T	Z		DN	P	K
32		Software Engineering (GK)				1		K1IBM_U13 K1IBM_U14 K1IBM_K03 K1IBM_K04 K1IBM_K05	15	25	1	1	0.68	T	Z		DN	P	K
33		Numerical Methods	2					K1IBM_W08	30	75	3	3	1.28	T	Z		DN		K
34		Numerical Methods			2			K1IBM_U09 K1IBM_U10	30	75	3	3	1.28	T	Z		DN	P	K
35		Measurement Systems	2					K1IBM_W08	30	50	2	2	1.28	T	Z		DN		K
36		Measurement Systems			2			K1IBM_U03 K1IBM_K03	30	50	2	2	1.28	T	Z		DN	P	K
37		Modelling of Biological Systems	2					K1IBM_W08	30	75	3	3	1.44	T	E		DN		K
38		Modelling of Biological Systems			2			K1IBM_U09 K1IBM_U10	30	75	3	3	1.28	T	Z		DN	P	K
39		Modelling of Biological Systems					1	K1IBM_U09 K1IBM_U10 K1IBM_K03	15	50	2	2	0.68	T	Z		DN	P	K
40		Conversion and Analysis of Non-electrical Signals	2					K1IBM_W03 K1IBM_W09 K1IBM_U10 K1IBM_K01	30	50	2	2	1.28	T	Z		DN		K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

41		Conversion and Analysis of Non-electrical Signals			2			K1IBM_U06 K1IBM_U09 K1IBM_U10 K1IBM_K01 K1IBM_K02	30	50	2	2	1.28	T	Z		DN	P	K
42		Medical Imaging Techniques	1					K1IBM_W03	15	25	1	1	0.68	T	Z		DN		K
43		Medical Imaging Techniques				2		K1IBM_W03 K1IBM_U06 K1IBM_U11	30	50	2	2	1.28	T	Z		DN	P	K
44		Academic Writing				1		K1IBM_U02 K1IBM_U07 K1IBM_K05	30	25	1		0.68	T	Z			P	K
45		Diploma work 1						K1IBM_W03 K1IBM_W06 K1IBM_U03 K1IBM_U04 K1IBM_U07 K1IBM_U11 K1IBM_K01 K1IBM_K04 K1IBM_K06	10	90	3		0.40	T	Z			P	K
46		Legal and Ethical Aspects in Biomedical Engineering					1	K1IBM_W08 K1IBM_U11 K1IBM_K04	15	25	1	1	0.68	T	Z		DN	P	K
47		Diploma Seminar					2	K1IBM_W03 K1IBM_W07 K1IBM_U01 K1IBM_U03 K1IBM_U06 K1IBM_K04 K1IBM_K05	30	50	2	2	1.28	T	Z		DN	P	K
48		Diploma work 2						K1IBM_W03 K1IBM_W06 K1IBM_U03 K1IBM_U04 K1IBM_U07	30	300	12	12	1.28	T	Z		DN	P	K

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

								K1IBM_U11 K1IBM_K01 K1IBM_K04 K1IBM_K06										
49		Practical Training						K1IBM_U03 K1IBM_U08 K1IBM_U11 K1IBM_U12 K1IBM_K03 K1IBM_K04 K1IBM_K06	0	150	6		6.00	T	Z			P	K
		Total	38	2	33	4	5		1285	2945	117	82	61.68					70	

Altogether (for main field of study blocks):

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes[5]	Number of ECTS points for BU classes[1]
lec	cl	lab	pr	sem	h	h	Points	Points	Points
38	2	33	4	5	1285	2945	117	85	61.68

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.2 List of optional blocks

4.2.1 List of general education blocks

4.2.1.1 *Liberal-managerial subjects blocks* *min. 5 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Bloc: humanities/social sci.	2					K1IBM_W05 K1IBM_K04	30	90	3		1.07	T	Z	O			KO
2		Bloc: humanities/social sci.	1					K1IBM_W05 K1IBM_K04	15	30	1		0.57	T	Z	O			KO
3		Bloc: NS courses	1					K1IBM_W05 K1IBM_K04	15	30	1		0.57	T	Z	O			KO
		Total	4	0	0	0	0		60	150	5		2.21						

4.2.1.2 *Foreign languages block* *min. 5 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Bloc: language courses A1/A2/B1/B2.1/C1.1		4				K1IBM_U07	60	60	2		2	T	Z	O		P	KO
2		Bloc: language courses B2.2/C1.2		4				K1IBM_U07	60	90	3		2	T	Z	O		P	KO
		Total	0	8	0	0	0		120	150	5		4					5	

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.2.1.3 *Sporting classes block* *min. 0 ECTS points*

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Bloc: sports		2				K1IBM_K07	30	0	0		0	T	Z	O		P	KO
2		Bloc: sports		2				K1IBM_K07	30	0	0		0	T	Z	O		P	KO
		Total	0	4	0	0	0		60	0	0		0					0	

Altogether for general education blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes[5]	Number of ECTS points for BU classes[1]
lec	cl	lab	pr	sem	h	h	Points	Points	Points
4	12	0	0	0	240	300	10	0	6.21

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.2.2 List of blocks

Bloc: optional courses 1 ***min. 10 ECTS points***

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Databases	0	0	0	3	0	K1IBM_U04 K1IBM_U13	45	100	4	4	1.88	T	Z		DN	P	S
2		Introduction to Bioinformatics	1	0	0	0	0	K1IBM_W08	15	50	2	2	0.68	T	Z		DN		S
3		Introduction to Bioinformatics	0	0	2	0	0	K1IBM_U03 K1IBM_K06	30	100	4	4	1.28	T	Z		DN	P	S
4		Mobile Application Development	0	0	0	3	0	K1IBM_U04 K1IBM_U13	45	100	4	4	1.88	T	Z		DN	P	S
5		Time Series Analysis	1	0	0	0	0	K1IBM_W09	15	50	2	2	0.68	T	Z		DN		S
6		Time Series Analysis	0	0	2	0	0	K1IBM_U04 K1IBM_U10	30	100	4	4	1.28	T	Z		DN	P	S

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Bloc: optional courses 2 ***min. 9 ECTS points***

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly 22umer of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Computer Graphics	2	0	0	0	0	K1IBM_W04 K1IBM_W09	30	75	3	3	1.28	T	Z		DN		S
2		Computer Graphics	0	0	2	0	0	K1IBM_U04	30	75	3	3	1.28	T	Z		DN	P	S
3		Network Technologies	0	0	0	3	0	K1IBM_U04 K1IBM_U13	45	100	4	4	1.88	T	Z		DN	P	S
4		Elements of Nonlinear Dynamics	2	0	0	0	0	K1IBM_W08	30	75	3	3	1.28	T	Z		DN		S
5		Elements of Nonlinear Dynamics	0	0	2	0	0	K1IBM_U10	30	75	3	3	1.28	T	Z		DN	P	S
6		Cross-platform Mobile Application Development	0	0	0	3	0	K1IBM_U04 K1IBM_U13	45	100	4	4	1.88	T	Z		DN	P	S

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Bloc: optional courses 3 ***min. 9 ECTS points***

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Statistical Methods in Bioengineering	0	0	2	0	0	K1IBM_W03 K1IBM_U03	30	75	3	3	1.28	T	Z		DN	P	S
2		Artificial Intelligence 1 (GK)	2	0	0	0	0	K1IBM_W08	30	75	3	3	1.28	T	Z		DN		S
3		Artificial Intelligence 1 (GK)	0	0	2	0	0	K1IBM_U08	30	75	3	3	1.28	T	Z		DN	P	S
4		Complex Systems (GK)	2	0	0	0	0	K1IBM_W09	30	75	3	3	1.28	T	Z		DN		S
5		Complex Systems (GK)	0	0	2	0	0	K1IBM_U04 K1IBM_U10	30	75	3	3	1.28	T	Z		DN	P	S
6		Virtual Reality Programming	0	0	2	0	0	K1IBM_U04 K1IBM_U08	30	75	3	3	1.28	T	Z		DN	P	S

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

Bloc: optional courses 4 ***min. 9 ECTS points***

No.	Code number/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form[2] courses / group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN classes[5]	BU classes[1]			university-wide [4]	Concerning scientific activities[5]	Practical [6]	Type[7]
1		Artificial Intelligence 2 (GK)	2	0	0	0	0	K1IBM_W08	30	75	3	3	1.28	T	Z		DN		S
2		Artificial Intelligence 2 (GK)	0	0	2	0	0	K1IBM_U08	30	75	3	3	1.28	T	Z		DN	P	S
3		Advanced Imaging Techniques	2	0	0	0	0	K1IBM_W03	30	75	3	3	1.28	T	Z		DN		S
4		Advanced Imaging Techniques	0	0	2	0	0	K1IBM_U06 K1IBM_U11	30	75	3	3	1.28	T	Z		DN	P	S
5		Computer Science in Medicine	0	0	0	0	2	K1IBM_W05 K1IBM_U06 K1IBM_K03 K1IBM_K05	30	75	3	3	1.28	T	Z		DN	P	S
6		Current Trends in Telemedicine	0	0	0	0	2	K1IBM_W05 K1IBM_U06 K1IBM_K03 K1IBM_K05	30	75	3	3	1.28	T	Z		DN	P	S

Altogether for specialization blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes[5]	Number of ECTS points for BU classes[1]
lec	cl	lab	pr	sem	h	h	Points	Points	Points
7	0	10	6	2	375	950	38	38	15.96

[1]BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes
[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]DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned
[6]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[7]KO – general education courses, PD – basic sciences courses, K – main field of study courses, S – specialization courses

4.3 Training block

Name of training	Student practice
Number of ECTS points	6
Number of ECTS points for DN[5] classes	6
Number of ECTS points for BU[1] classes	6
Training crediting mode	After completing the internship, the student is obliged to submit to the dean's plenipotentiary for internships a report on the work in which he participated or which he conducted independently. The report should be accepted and reviewed by the student's supervisor at the place of the internship. The student receives a credit for the completed practice.
Code:	
Training duration	four weeks
Training objective	Becoming familiar with fundamental tasks and responsibilities specific to engineer’s work, especially in the field of biomedical engineering.

4.4 Diploma dissertation block

Type of diploma dissertation	Engineering
Number of diploma dissertation semesters:	2
Number of ECTS points	15
Code:	
Character of diploma dissertation:	Diploma dissertation is an account of original, independent project that demonstrates student’s competencies, project design and implementation, literature review, and optionally data collection, and analysis and discussion of results.
Number of ECTS points for BU[1] classes	1.60
Number of ECTS points for DN[5] classes	15

5 Ways of verifying assumed learning outcomes

Type of classes	Ways of verifying assumed learning outcomes:
lecture	examination, midterm/final test
class	midterm/final test
laboratory	pretest, laboratory report
project	project presentation
seminar	group discussion, topic presentation, essay

training	practical training report
diploma dissertation	diploma defense

6 Range of diploma examination

The scope of the diploma examination is determined by the Biomedical Engineering Graduation Committee and communicated to students by the end of the penultimate semester of study at the latest. The diploma examination is made-up of the thesis presentation, discussion of the results with the examination committee members, and diploma exam.

7 Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular blocks

All courses–credited with exam or grade–are defined by the provisions of the Rules of Study at the Wroclaw University of Science and Technology.

8 Plan of studies (attachment no. 3 to program of studies)

Approved by faculty student government legislative body:

Date — Name and surname, signature of student representative

Date — Dean's signature