

PLAN OF STUDIES

FACULTY: OF FUNDAMENTAL PROBLEMS OF TECHNOLOGY

MAIN FIELD OF STUDY: BIOMEDICAL ENGINEERING

EDUCATION LEVEL: first level studies (engineer)

FORM OF STUDIES: full-time

PROFILE: general academic

SPECIALIZATION: MEDICAL INFORMATICS

LANGUAGE OF STUDY: ENGLISH

In effect since **2022/2023**

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

Semester 1

Obligatory courses / groups of courses

Number of ECTS points 30

No.	Course/ 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 of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Algebra and Analytic Geometry	2					K6IBM_W01 K6IBM_K01	30	75	3	0	2	T	E	O			PD
2		Algebra and Analytic Geometry		2				K6IBM_U10 K6IBM_K01	30	60	2	0	1	T	Z	O		P2	PD
3		Mathematical Analysis 1	2					K6IBM_W01 K6IBM_K01	30	100	4	0	2	T	E	O			PD
4		Mathematical Analysis 1		2				K6IBM_U10 K6IBM_K01	30	90	3	0	2	T	Z	O		P3	PD
5		Anatomy for Biomedical Engineers	2					K6IBM_W02 K6IBM_U06 K6IBM_K03	30	50	2	0	2	T/Z	Z				PD
6		Physics 1	3					K6IBM_W01 K6IBM_U06 K6IBM_K01 K6IBM_K03	45	75	3	0	2	T	E	O			PD
7		Physics 1		2				K6IBM_U06 K6IBM_U10 K6IBM_K01 K6IBM_K03 K6IBM_K05	30	60	2	0	1	T	Z	O		P2	PD
8		Principles of Chemistry		2				K6IBM_W01 K6IBM_U10 K6IBM_K01	30	60	2	0	1	T	Z			P2	PD
9		Principles of Chemistry	1					K6IBM_W01	15	50	2	0	1	T	Z				PD

10		Introduction to Programming	2					K6IBM_W04	30	50	2	2	1	T	Z				KO
11		Introduction to Programming		2				K6IBM_U04	30	75	3	3	2	T	Z			P3	KO
12		Introduction to Medical Electronics 1	2					K6IBM_W03 K6IBM_U01 K6IBM_K01	30	50	2	0	1	T/Z	Z				K
Total			14	10	0	0	0		360	795	30	5	18					12	

Altogether in semester:

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					
14	10	0	0	0	360	795	30	5	18

Semester 2

Obligatory courses / groups of courses

Number of ECTS points 27

No.	Course/ 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 of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Mathematical Analysis 2	2					K6IBM_W01 K6IBM_K01	30	90	3	0	2	T	E	O			KO
2		Mathematical Analysis 2		2				K6IBM_U10 K6IBM_K01	30	90	3	0	2	T	Z	O		P3	KO
3		Physics 2	2					K6IBM_W01 K6IBM_K01 K6IBM_K03 K6IBM_K05	30	50	2	0	1	T	E	O			KO
4		Physics 2			3			K6IBM_U09 K6IBM_K01 K6IBM_K03 K6IBM_K05	45	90	3	0	2	T	Z	O		P3	KO
5		Principles of Organic Chemistry	2					K6IBM_W01	30	60	2	0	1	T	Z				KO
6		Principles of Medical Electronics 2	2					K6IBM_W03 K6IBM_W04	30	50	2	0	1	T/Z	Z				K
7		Principles of Medical Electronics 2		1				K6IBM_W09 K6IBM_U04 K6IBM_K02	15	50	2	0	1	T	Z			P2	K
8		Introduction to Object Oriented Programming	2					K6IBM_W03	30	75	3	3	2	T/Z	E		DN		K
9		Introduction to Object Oriented Programming			2			K6IBM_U04 K6IBM_K06	30	75	3	3	2	T	Z		DN	P3	K
10		Propaedeutics of Medical Sciences	2					K6IBM_W02 K6IBM_K04	30	30	1	1	1	T/Z	Z		DN		K

11		Introduction to Biomedical Optics and Biophotonics	2					K6IBM_W03	30	50	2	2	1	T/Z	Z		DN		K
12		Introduction to Biomedical Optics and Biophotonics					1	K6IBM_U04 K6IBM_U06	15	30	1	1	1	T	Z		DN	P1	K
Total			14	3	5	0	1		345	740	27	10	17					12	

Optional courses / groups of courses (minimum 30 hours in semester, 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					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			l e c	cl	lab	pr	sem		Universitywide ⁴	CNPS	Total	Univ ers itywide ⁴	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		PO-W11 ST-IL/15/NH1	2					30	90	3	0	1,5	T	Z	O			KO	
Total			2					30	90	3		1,5							

Altogether in semester:

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					
16	3	5	0	1	375	830	30	10	18,5

Semester 3

Obligatory courses / groups of courses

Number of ECTS points 26

No.	Course/ 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 of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		Universitywide ⁴	CNPS	Total	Universitywide ⁴	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Databases	2					K6IBM_W09 K6IBM_W08	30	75	3	3	2	T/Z	E				K
2		Databases			2			K6IBM_U13 K6IBM_U14	30	75	3	3	2	T	Z			P3	K
3		Microcontrollers	1					K6IBM_W03 K6IBM_K01	15	30	1	1	1	T/Z	Z				K
4		Microcontrollers			3			K6IBM_W03 K6IBM_U05 K6IBM_K02	45	90	3	3	2	T	Z			P3	K
5		Principles of Medical Electronics 2			1			K6IBM_U04	15	30	1	1	1	T	Z			P1	K
6		Statistics and Probability Theory	2					K6IBM_W01 K6IBM_U01 K6IBM_K01	30	75	3	0	2	T	Z	O			K
7		Statistics and Probability Theory		2				K6IBM_U05 K6IBM_U10 K6IBM_K01	30	75	3	0	2	T	E	O		P3	K
8		Mobile Application Development	2					K6IBM_W09	30	50	2	1	1	T/Z	Z				K
9		Mobile Application Development			2			K6IBM_U04 K6IBM_U10	30	60	2	2	1	T	Z			P2	K
10		Introduction to Biomedical Optics and Biophotonics			1			K6IBM_U08 K6IBM_U11 K6IBM_K03	15	30	1	1	1	T	Z			P1	K
11		Introduction to Physiology	1					K6IBM_W02 K6IBM_K01 K6IBM_K06	15	30	1	1	1	T/Z	Z				K
12		Programing in Python			2			K6IBM_U04	30	75	3	3	2	T	Z			P3	K

	Total	8	2	11	0	0		315	695	26	19	18					16	
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Optional courses / groups of courses (minimum 90 hours in semester, 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					Learning 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	DN5 classes	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
		Foreign language A1/A2/ B1/ B2.1/ C1.1		4				K6IBM_U07	60	60	2	0	2	T	Z	O		P2	KO
		NH2	1					K6IBM_W05 K6IBM_K04	15	30	1	0	1	T	Z	O			KO
		NS	1					K6IBM_W05 K6IBM_K04	15	30	1	0	1	T	Z	O			KO
		Total	2	4	0	0	0		90	120	4	0	4					2	

Altogether in semester:

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					
10	6	11	0	0	405	815	30	19	22

Semester 4

Obligatory courses / groups of courses

Number of ECTS points 18

No.	Course/ 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 of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN5 classes	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Biochemistry	2					K6IBM_W01 K6IBM_W03	30	75	3	0	2	T	E				K
2		Biophysics	1					K6IBM_W03	15	30	1	0	1	T/Z	Z				K
3		Biophysics		1				K6IBM_U09	15	50	2	0	1	T	Z			P2	K
4		Biophysics			1			K6IBM_U09 K6IBM_U10 K6IBM_K01 K6IBM_K03	15	60	2	0	1	T	Z			P2	K
5		Electromedical Instrumentation	1					K6IBM_W03 K6IBM_W04 K6IBM_K01	15	50	2	2	1	T/Z	Z		DN		K
6		Electromedical Instrumentation			1			K6IBM_U08 K6IBM_U11 K6IBM_K01 K6IBM_K03	15	60	2	2	1	T	Z		DN	P2	K
7		Network Technologies	2					K6IBM_W08 K6IBM_W09 K6IBM_K01	30	75	3	2	2	T/Z	E		DN		K
8		Network Technologies			2			K6IBM_U13 K6IBM_U14 K6IBM_K05	30	75	3	2	2	T	Z		DN	P3	K
Total			6	1	4	0	0		165	475	18	8	11					9	

Optional courses / groups of courses (minimum 165 hours in semester, 12 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					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way3 of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN5 classes	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Foreign language B2.2/C1.2		4				K6IBM_U07	60	90	3	0	0	T	Z	O		P3	KO
2		Databases				1		K6IBM_U13 K6IBM_U14	15	50	2	2	1	T	Z		DN	P2	K
3		Introduction to Bioinformatics	1					K6IBM_W08	15	50	2	2	1	T/Z	Z		DN		K
4		Introduction to Bioinformatics			2			K6IBM_U14 K6IBM_K06	30	75	3	2	2	T	Z		DN	P3	K
5		Mobile Application Development				1		K6IBM_U04 K6IBM_U10	15	50	2	2	1	T	Z		DN	P2	K
6		Time Series Analysis	2					K6IBM_W09	30	75	3	3	2	T/Z	Z		DN		K
7		Time Series Analysis			2			K6IBM_U04 K6IBM_U10	30	75	3	3	2	T	Z		DN	P3	K
8		Sports		2				K6IBM_K08	30	30	0	0	0	T	Z	O			KO
Total			3	6	4	2	0		225	495	18	14	9					13	

Altogether in semester:

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					
9	7	8	2	0	330/390	900/970	30/36	18/22	16/20

Semester 5

Obligatory courses / groups of courses

Number of ECTS points 21

No.	Course/ 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 of course/group of courses	Way ³ of crediting	Course/group of courses			
	lec		cl	lab	pr	sem	ZZU		CNPS	Total	DN5 classes	BU1 classes	Universitywide ⁴			Concerning scientific activities ⁵	Practical ⁶	Type ⁷	
1		Digital Signal Processing	2					K6IBM_W03 K6IBM_K01	30	75	3	3	2	T/Z	E		DN		K
2		Digital Signal Processing			2			K6IBM_U05 K6IBM_U10 K6IBM_K01	30	75	3	3	2	T	Z		DN	P3	K
3		Software Engineering					1	K6IBM_U13 K6IBM_U14 K6IBM_K03 K6IBM_K04 K6IBM_K06	15	30	1	1	1	T	Z		DN	P1	S
4		Software Engineering			2			K6IBM_U13 K6IBM_U14 K6IBM_K03 K6IBM_K04 K6IBM_K06	30	75	3	3	2	T	Z		DN	P3	S
5		Software Engineering	2					K6IBM_W08	30	75	3	3	2	T/Z	E		DN		S
6		Numerical Methods	2					K6IBM_W08	30	75	3	3	2	T/Z	Z		DN		S
7		Numerical Methods			2			K6IBM_U14	30	75	3	3	2	T	Z		DN	P3	S
8		Measurement systems	2					K6IBM_W08	30	50	2	2	2	T/Z	Z		DN		K
Total			8	0	6	1	0		225	515	21	21	15					10	

Optional courses / groups of courses (minimum 105 hours in semester, 9 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					Learning 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	DN5 classes	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Sports		2				K6IBM_K08	30	30	0	0	0	T	Z				KO
2		Computer Graphics	2					K6IBM_W04 K6IBM_W09	30	75	3	3	2	T/Z	Z		DN		S
3		Computer Graphics			2			K6IBM_U13 K6IBM_U14	30	75	3	3	2	T	Z		DN	P3	S
4		Network technologies				1		K6IBM_U13 K6IBM_U14	15	75	3	3	1	T	Z		DN	P3	S
5		Complex Systems	2					K6IBM_W09	30	75	3	3	2	T/Z	Z		DN		S
6		Complex Systems			2			K6IBM_U04 K6IBM_U10	30	25	3	3	2	T	Z		DN	P3	S
Total			4	2	4	1	0		165	425	15	15	9					9	

Altogether in semester:

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					
12	2	10	2	0	330/390	820/940	30/36	30/36	21/24

Semester 6

Obligatory courses / groups of courses

Number of ECTS points 19

No.	Course/ 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 of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN5 classes	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Modelling of Biological Systems	2					K6IBM_W08	30	75	3	3	2	T/Z	E		DN		S
2		Modelling of Biological Systems			2			K6IBM_U13 K6IBM_U14	30	75	3	3	2	T	Z		DN	P3	S
3		Modelling of Biological Systems					1	K6IBM_U13 K6IBM_U14 K6IBM_K03	15	50	2	2	1	T	Z		DN	P2	S
4		Measurement systems			2			K6IBM_U13 K6IBM_U14 K6IBM_K03	30	75	3	3	2	T	Z		DN	P3	K
5		Conversion and Analysis of Non-electrical Signals	1					K6IBM_W03 K6IBM_U10 K6IBM_K01	15	30	1	1	1	T/Z	Z		DN		K
6		Conversion and Analysis of Non-electrical Signals			1			K6IBM_U06 K6IBM_U09 K6IBM_U10 K6IBM_K01 K6IBM_K02	15	50	2	2	1	T	Z		DN	P2	K
7		Medical Imaging Techniques				1		K6IBM_W03 K6IBM_U06 K6IBM_U11 K6IBM_K05	15	50	2	2	1	T	Z		DN	P2	K
8		Medical Imaging Techniques	1					K6IBM_W03	15	50	2	2	1	T/Z	Z		DN		K
9		Academic Writing			1			K6IBM_U02 K6IBM_U07 K6IBM_U08 K6IBM_K06	15	30	1		1	T	Z		DN	P1	K
Total			4	0	6	1	1		180	485	19	18	12					13	

Optional courses / groups of courses (minimum 105 hours in semester, 11 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					Learning 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	DN ⁵ classes	BU ¹ classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Statistical Methods in Bioengineering			2			K6IBM_W03 K6IBM_U03 K6IBM_U04	30	75	3	3	2	T	Z		DN	P3	S
2		Artificial Intelligence 1	2					K6IBM_W08	30	75	3	3	2	T/Z	Z		DN		S
3		Artificial Intelligence 1			2			K6IBM_U13	30	75	3	3	2	T	Z		DN	P3	S
4		Elements of Nonlinear Dynamics	1					K6IBM_W08	15	60	2	2	1	T/Z	Z		DN		S
5		Elements of Nonlinear Dynamics			1			K6IBM_U10	15	60	2	2	1	T	Z		DN	P2	S
6		Computer Science in Medicine					1	K6IBM_W05 K6IBM_U06 K6IBM_K03 K6IBM_K06	15	60	2	2	1	T	Z		DN	P2	S
Total			3	0	5	0	1		135	395	15	15	9					10	

Altogether in semester:

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					
7	0	11	1	2	255/315	775/850	30/34	30/34	18/21

Semester 7

Obligatory courses / groups of courses

Number of ECTS points 3

No.	Course/ 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 of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Legal and Ethical Aspects in Biomedical Engineering					1	K6IBM_W08 K6IBM_U11 K6IBM_W08	15	30	1	1	1	T	Z		DN	P1	K
2		Diploma Seminar					2	K6IBM_W03 K6IBM_W07 K6IBM_U01 K6IBM_U03 K6IBM_U06 K6IBM_K05 K6IBM_K06	30	60	2	2	2	T	Z		DN	P2	K
Total			0	0	0	0	3		45	90	3	3	3					3	

Optional courses / groups of courses (minimum 90 hours in semester, 27 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					Learning 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	DN5 classes	BU1 classes			Universitywide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1		Artificial Intelligence 2	2					K6IBM_W08	30	75	3	3	2	T/Z	Z		DN		S
2		Artificial Intelligence 2			2			K6IBM_U13 K6IBM_K06	30	75	3	3	2	T	Z		DN	P3	S
3		Advanced Imaging Techniques	2					K6IBM_W03	30	75	3	3	2	T/Z	Z		DN		
4		Advanced Imaging Techniques			2			K6IBM_U06 K6IBM_U11	30	75	3	3	2	T	Z		DN	P3	
5		Diploma Project						K6IBM_W03 K6IBM_U03 K6IBM_U04 K6IBM_U07 K6IBM_U11 K6IBM_K01 K6IBM_K05 K6IBM_K07	30	450	15	15	2		Z		DN	P15	S
6		Practical training						K6IBM_U03 K6IBM_U08 K6IBM_U11 K6IBM_U12 K6IBM_K03 K6IBM_K05 K6IBM_K07		160	6	6			Z		DN	P6	S
Total			4	0	4	0	0		150	890	33	33	10					27	

Altogether in semester:

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					
4	0	4	0	3	135/195	875/1000	30/36	30/36	9/13

2. Set of examinations in semestral arrangement

Course / group of courses code	Names of courses / groups of courses ending with examination	Semester
	1. Algebra and Analytic Geometry 2. Mathematical Analysis 1 3. Physics 1	1
	1. Mathematical Analysis 2 2. Physics 2 3. Introduction to Object-Oriented Programming	2
	1. Databases 2. Statistics and Probability Theory	3
	1. Biochemistry 2. Network Technologies	4
	1. Digital Signal Processing 2. Software Engineering	5
	1. Modelling of Biological Systems	6

3. Numbers of allowable deficit of ECTS points after semesters

Semester	Allowable deficit of ECTS points after semester
1	13
2	13
3	13
4	12
5	12
6	5
7	0