

Syllabus for academic year:2020/2021														
Training cycle:														
Description of the course														
Module/Course		Biophysics				Group of detailed education results					ults			
								Group code B			Grou	ıp nam	е	
												Scientific bases		
												of m	edicin	e
Faculty			Dentistry											
Maior														
Unit realizing the subje	ct		Departme	nt	of Biop	hysics	and Ne	eurob	iology,					
			Medical U	niv	/ersity (, of Wro	cław		0,,					
Specialties					<u> </u>									
Level of studies			Uniform n	าลยู	gister st	udies X	<*							
			1 st degree	st	udies X									
			2 nd degree	e st	tudies									
			3 rd degree	e st	udies 🛛									
			postgraduate studies 🗆											
Form of studies			X full-time 🗌 part-time											
Year of studies			1				Semester 🗌			🗆 Win	Winter			
								X Summer						
Type of course			X obligatory											
			□ limited choice											
			□ free choice / elective											
Course			X major 🗆 basic											
Language of instructior	۱		Polish X English other											
* mark \square with an X														
					Numl	per of h	nours							
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course	_	SE)	r class		sses (Class	simula (CSC)	asses	M)	guag	ucati	Pract	(Stud	(EL)
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	Lectu	Semi	Audit		Clinic	Laboı	Class	Pract (PCP)	Speci studio	Forei	Physi (PE)	Vocat	Self-S work	E-lea
Winter Semester		I			I	L							I	
Direct (contact)														
education														
Online learning														
(synchronous)				1										



Distance learnin	g													
(asynchronous)	0													
Summer Semester														
Direct (contact)						37								
education														
Online learning	10													
(synchronous)														
Online learning														
(asynchronous)														
TOTAL per year:														
Direct (contact)						37								
education														
Online learning	10													
(synchronous)														
Online learning														
(asynchronous)														
Educational obje	ectives (ma:	«. 6 it	:ems)											
O1. Studies on b	bases of bio	mec	hanics in r	elat	ion t	o the o	rgan of	f mas	tication	ı .				
O2. Getting kno	wledge ab	out s	elected life	e fur	nctio	ns of a	humar	n beir	ıg – stu	dies o	on physio	cal ba	se of	
function of sens	sory organs	: eye	s and ears	•					_					
03 . Getting knc	wledge ab	out p	physical ba	ise o	of fui	nction o	of mod	ern c	liagnost	tic te	chnique	s use	d for im	aging
of human tissue	es and orga	ns (U	ISG, MIRI).		£									L
O4. Getting kno	wiedge ab	out p	nysical ba	se o	f rad	liology a	and ap	plicat	ION OT I	onisii	ng radiai	tion ir	i dentis	try.
OS. Getting kno	ity to use an	out p	nysical ba	seo		iction o	r laser	and a	acurom	optica		asers	in dent	istry.
electrical optic	al and othe	r mo	thods get	луе tina	quip: abili	ity to us	periori se prof		asurem	ents puto	appiying r softwa	s spec	d to an	nc, duzo
obtained experi	electrical, optical and other methods, getting ability to use professional computer software and to analyze obtained experimental data													
Education result	optained experimental data. Education result matrix for module/course in relation to verification methods of the intended education result													
	and the type of class										e intende	ed edi	ucation	result
				a	nd th	on to ve le type (erificati of class	on m	ethods	ofthe	e intende	ed edi	ucation	result
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[l .	
	BW 10	4.Knowledge of principles of function of ultrasonic devices and their application in	Mentioned above	L, LC
	BW 11	diagnostics and therapy . 5.Knowledge of principles of photometry and principles of function of optical fibers and application of light sources in dentistry .	Mentioned above	L, LC
	BW 12	6.Knowledge of principles of work of lasers and their application in dentistry .	Mentioned above	L, LC
	BW 19	7.Knowledge of selected life functions of a human organism – physical bases of function of nerve system and function of selected sensory organs.	Mentioned above	L, LC
U 01	BU 2	1.Ability of interpretation of	Oral answers and	L, LC
		physical phenomena in a	colloquia during	
		human organism, in particular,	laboratory practicals,	
		in the organ of mastication .	written examination	
			test	
	BU 3	2.Ability of application of physical processes in a work of a dentist.	Mentioned above	L, LC
K 01		Student actively participates in	Credit note for	LC
		a team work;	completed laboratory	
		is creative;	practicals	
		thinks logically and		LC
		independently;	Mentioned above	LC
		learns how to face challenges;	Montioned stress	
		is interested in a self-	ivientioned above	LC
**				

** L - lecture; SE - seminar; AC – auditorium classes; MC – major classes (non-clinical); CC – clinical classes; LC – laboratory classes; SCM – specialist classes (magister studies); CSC – classes in simulated conditions; FLC – foreign language course; PCP practical classes with patient; PE – physical education (obligatory); VP – vocational practice; SS – self-study, EL – E-learning .

Please mark on scale 1-5 how the above effects place your classes in the following categories: communication of knowledge, skills or forming attitudes:

Knowledge: +++++

Skills: +++++

Social competences: +++++



Student's amount of work (balance of ECTS points)					
Student's workload	Student Workload (h)				
(class participation, activity, preparation, etc.)					
1. Contact hours:	35				
2. Online learning hours (e-learning):	12				
3. Student's own work (self-study):	43				
Total student's workload	90				
ECTS points for module/course	5				
Comments					

Content of classes (please enter topic words of specific classes divided into their didactic form and remember how it is translated to intended educational effects)

Lectures

- **1.** Principles of biomechanics in relations to human organism with a special regard to the organ of mastication. Neuromuscular transmission. Molecular mechanism of skeletal muscle contraction.
- 2. Sounds and hearing.
- 3. Ultrasound, principles of work of ultrasonic devices, application of ultrasound in dentistry.
- 4. Light and vision.
- 5. Ionising radiation and physical base of its application in medicine.
- 6. Methods of tissue imaging applying ionising radiation (CT, PET)
- 7. Physical base of nuclear magnetic resonance (NMR).
- 8. Magnetic Resonance Imaging (MRI).
- **9.** Principles of work of a laser.
- **10.** Types of lasers and their practical application in dentistry.

Seminars None

Practical classes

- 1. Emission spectra of elements.
- 2. Nephelometric determination of colloid concentration.
- **3.** Examination of optical rotation of solutions and determination of concentration using a polarimeter.
- **4.** Fluorescence analysis.
- **5.** Determination of focal length and radius of curvature of the eye model and focal length of correcting lens.
- 6. Study on the time resolving power of a human eye.
- 7. Ionic migration velocity.
- 8. Estimation of the difference in visual latency in the Pulfrich effect.
- 9. Membrane potential measurement Nernst equilibrium.
- 10. Dipole model of a heart.
- **11.** Analog model of synaptic transmission.
- **12.** Magnetic moment in the magnetic field.
- **13.** Geiger–Müller counter characteristics.



UNIWERSYTET MEDYCZNY IM. Piastów Śląskich we Wrocławiu

Appendix to Resolution No. 2186 of Senate of Wroclaw Medical University of 1 July 2020

- **14.** Attenuation of β radiation by aluminum.
- **15.** Computer simulation of action potential generation.
- **16.** Microcalorimetric simulation studies on phase transitions in lipids.
- 17. Audiometry.
- **18.** Ultrasonic Doppler effect.
- **19.** Study of properties of electromagnetic waves.
- **20.** Harmonic analysis of acoustic waves.
- **21.** Ultrasound probe.
- 22. Estimation of volume and radius of a single molecule applying the viscometric method.
- **23.** Application of lasers in surgery of soft tissues.
- 24. Application of lasers in surgery of bone tissues.

Other

None

Basic literature (list according to importance, no more than 3 items)

- 1. Cotterill R. *Biophysics. An introduction*. J. Wiley & Sons, 2004.
- 2. Davidovits P. *Physics in biology and medicine.* 4-th ed. Amsterdam: Elsevier Academic Press, 2013.
- 3. Bushberg J.T. [et al.] *The essential physics of medical imaging.* 3-rd ed. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2012.

Additional literature and other materials (no more than 3 items)

1. Glaser R. Biophysics. Springer-Verlag, 2004.

2. Glaser R. *Biophysics an introduction.* 2-nd ed. – Berlin: Springer, 2012.

3. Hille B. Ionic Channels of Excitable Membranes. Sinauer Associates inc. Sunderland, 2004.

Didactic resources requirements (e.g. laboratory, multimedia projector, other...)

Equipment setups for laboratory practicals in laboratories, multimedia projectors, computers, standard and specialist software.

Preliminary conditions (minimum requirements to be met by the student before starting the module/course)

A student should have complete knowledge in the area of physics at the high school level, especially in areas of mechanics, optics, electricity, nuclear physics.

Conditions to receive credit for the course (specify the form and conditions of receiving credit for classes included in the module/course, admission terms to final theoretical or practical examination, its form and requirements to be med by the student to pass it and criteria for specific grades)

Final examination test - condition of admittance is a previous getting a final credit note from the laboratory classes and attendance in all lectures.

Grade:	Criteria (only for courses/modules ending with an examination)
Very Good	
(5.0)	
Good Plus	



Criteria (only for courses/modules ending with e credit)
Criteria (only for courses/modules ending with e credit) The requirement for getting credit from lectures is attendance in all the
Criteria (only for courses/modules ending with e credit) The requirement for getting credit from lectures is attendance in all the lectures. The requirement for getting credit from laboratory practicals is
Criteria (only for courses/modules ending with e credit) The requirement for getting credit from lectures is attendance in all the lectures. The requirement for getting credit from laboratory practicals is getting credit notes from all 13 practicals. The requirements for getting credit
Criteria (only for courses/modules ending with e credit) The requirement for getting credit from lectures is attendance in all the lectures. The requirement for getting credit from laboratory practicals is getting credit notes from all 13 practicals. The requirements for getting credit from a practical is correct performance of the experiment, correct
Criteria (only for courses/modules ending with e credit) The requirement for getting credit from lectures is attendance in all the lectures. The requirement for getting credit from laboratory practicals is getting credit notes from all 13 practicals. The requirements for getting credit from a practical is correct performance of the experiment, correct preparation of the final report and positive note from the student theoretical

Grade:	Criteria (examination evaluation criteria)
Very Good	56 - 60
(5.0)	
Good Plus	51 - 55
(4.5)	
Good	46 - 50
(4.0)	
Satisfactory Plus	41 - 45
(3.5)	
Satisfactory	36 - 40
(3.0)	
Unit realizing the	Department of Biophysics and Neurobiology
subject	Medical University of Wrocław
Unit address	ul. Chałubińskiego 10, 50-368 Wrocław
Telephone	71 784 15 51 51
E-Mail	aleksandra.zygmunt@umed.wroc.pl

Person responsible	Dr hab.Andrzej Teisseyre
for module	
Coordinator	Dr hab.Andrzej Teisseyre
Telephone	696 – 294 - 255
E-Mail	andrzej.teisseyre@umed.wroc.pl



List of persons conducting specific classes								
Full name	Degree/scientific	Discipline	Performed	Form of classes				
	or professional		profession					
	title							
Andrzej	Ph. D., associate	Biomedical	University	Lecture, laboratory				
Teisseyre	professor	sciences -	researcher and	practicals				
		biophysics	lecturer					
Jacek Matys	Ph. D.	Medical	Dentist	Laboratory				
		sciences-		practicals				
		surgery						
Kamila Środa-	Ph. D., associate	Biomedical	University	Laboratory				
Pomianek	professor	sciences -	researcher and	practicals				
		biophysics	lecturer					
Anna Palko-	Ph. D.	Biomedical	University	Laboratory				
Labuz		sciences -	researcher and	practicals				
		biophysics	lecturer					

Date of Syllabus development

Syllabus developed by

......Andrzej Teisseyre, Ph. D, associate professor..

Signature of Head of teaching unit

.....

Signature of Faculty Dean



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Appendix to Resolution No. 2186 of Senate of Wroclaw Medical University of 1 July 2020