



Pomeranian Medical University in Szczecin

SYLLABUS of the MODULE (SUBJECT)

valid from the academic year 2018/2019

General Information

Module title	Biophysics
Module type	Obligatory
Faculty	Faculty of Medicine and Dentistry
Field of study	Medicine and Dentistry
Major	Not applicable
Level of study	long-cycle (S2J)
Mode of study	intramural
Year of studies, semester	Year I, semester 1
ECTS credits (incl. semester breakdown)	3
Type/s of training	seminars (10 h)/ practical (30 h)
Form of assessment	graded assessment
Head of the Department/ Clinic, Unit	Dr hab. n. med. Wojciech Podraza, podrazaw@pum.edu.pl
Tutor responsible for the module	Dr hab. n. med. Wojciech Podraza, podrazaw@pum.edu.pl
Department's/ Clinic's/ Unit's website	http://www.pum.edu.pl/wydzialy/wydzial-lekarsko-biotechnologiczny/zaklad-fizyki-medycznej
Language	English

Detailed information

Module objectives		The lectures and exercises aim at presenting basic biophysics to the physiological basis of physiological processes, familiarizing with the physical phenomena underlying modern medical diagnostics and therapy and learning the general principles of medical apparatus and mechanisms of physical effects on the organism as well as possibilities of using biophysical and medical physics in dentistry.
Prerequisite /essential requirements	Knowledge	Knowledge of physics and mathematics from the high school.
	Skills	Analysis and interpretation of research results (student can define and estimate an error of measurements, math function, can perform calculations needed by the dentist).
	Competences	Openness to knowledge, willingness to cooperate in a group, aware of the high requirements of the future dentist, habit of self-education.

Description of the learning outcomes for the subject /module			
No. of learning outcome	Student, who has passed the (subject) knows /is able to /can:	SYMBOL (referring the standards) ZEK	Method of verification of learning outcomes *
W01	knows rules of statics and biomechanics regarding human body	K_B.W07	K, O.
W02	knows mechanics of masticatory system	K_B.W08	K, W.
W03	knows imaging techniques of tissues and organs and operating principles of appropriate diagnostic equipment	K_B.W09	K, O, W.
W04	knows principles of operation of ultrasonic equipment	K_B.W10	K, RZĆ, W, O.
W05	knows principles of photometry and optical fibers and application of light sources in dentistry	K_B.W11	K, W, RZĆ.
W06	knows principles of operation of lasers in dentistry	K_B.W12	K, W.
W07	knows principles of operation of dental equipment	K_B.W13	RZĆ, O.
U01	interprets physical phenomena going on in stomatognathic system	K_B.U02	RZĆ, O.
U02	uses physical processes in dental practice	K_B.U03	RZĆ.
K01	shows habit of self-education and lifelong education	K_K01	O.

Table presenting learning outcomes of the subject/module in relation to the form of classes

No.	SYMBOL (referring the standards) ZEK	Type/s of training							
		Lecture	Seminar	Practical classes	Clinical classes	Other...
1.	K_B.W07		X						
2.	K_B.W08		X						
3.	K_B.W09		X	X					
4.	K_B.W10		X	X					
5.	K_B.W11		X	X					
6.	K_B.W12		X						
7.	K_B.W13		X						
8.	K_B.U02			X					
9.	K_B.U03			X					
10	K_K.01			X					

Module contents no.	Description of teaching programme	No. of hours	References to learning outcomes
	Seminars:		
TK01	Ultrasonic techniques - basic concepts, the diagnostic and therapeutic use.	2	W03, W04, W07, U02, K01.
TK02	Radiation and radioactivity.	2	W03, W07, U01, U02, K01.
TK03	Modern imaging methods (MRI, PET, USG, CT, thermography) in medicine.	2	W03, U01, U02, K01.
TK04	Biomechanics in dentistry.	2	W01, W02, U01, U02, K01.
TK05	Laser application in dentistry	2	W06, W07, U01, U02, K01.
	Practical classes:		
TK06	Introduction to biophysics practical classes.	2	U01, U02, K01.
TK07	Electric and magnetic phenomenon in living organisms. Influence of the environmental factors on living organisms, physical therapy in medicine.	2	W07, U01, U02, K01.
TK07	Impedancje metod application in medicine. Endometrics root canal working length determination	2	W03, U01, U02, K01.
TK09	Microscopy in dentistry. Measurement of microobjects.	2	W03, W05, U02, K01.
TK10	Optical properties of the tissue. Polarymetry and refractometry measurements.	2	W05, U02, K01.
TK11	Spectroscopy. Measurement of absorption spectra of biological compounds in visible and ultraviolet range.	2	W02, W05, U01, U02, K01.
TK12	Virtual laboratory on spectroscopy measurements – SPECTROsimulator.	2	W02, W05, U01, U02, K01.
TK13	Ionizing radiation. Determination of the linear and mass attenuation coefficient for different materials.	2	W03, U01, U02, K01.
TK14	Virtual laboratory on ionizing radiation with the help of WOPsimulator.	2	W03, U02, K01.
TK15	Physics of the ear and hearing, audiometry measurements.	2	W03, U02, K01.
TK16	Thermal and mechanical effect identification and measurement in the water treated by the ultrasound.	2	W03, W04, W07, U01, U02, K01, U02, K01.
TK17	Lungs and breathing – biophysical aspects. Spirometry measurements.	2	W03, U02, K01.
TK18	Diffusion potentials measurement across an artificial membrane.	2	W03, U01, U02, K01.
TK19	Calculations	2	U01, U02, K01.
TK20	Student's presentations.	2	W02, W04, W05, W06, U01, U02, K01.

Booklist
Obligatory literature:
1. Cameron J., Skofronick J.G., Grant R.M.: <i>Physics of the Body</i> , Medical Physics Publishing 1992.
2. Tuliscka M.: <i>Biophysics, Laboratory Textbook</i> , Poznań 1997.
3. Kirsten Franklin, Paul Muir, Terry Scott, Lara Wilcocks and Paul Yates, " <i>Introduction to Biological Physics for the Health and Life Sciences</i> ", ISBN 978-0-470-66593-0, 2010 John Wiley and Sons.
Supplementary literature:
1. Jim Breithaupt, "Physics", third edition, ISBN 978-0-230-23192-4, 2010 Palgrave Macmillan

Student's workload (balance sheet of ECTS credits)			
Form of student's activity (in-class participation; activeness, produce a report, etc.)	Student's workload [h]		
	Tutor	Student	Average
Contact hours with the tutor	44	44	
Time spent on preparation to seminars/ practical classes		15	
Time spent on reading recommended literature		5	
Time spent on writing report/making project		10	
Time spent on preparing to colloquium/ entry test			
Time spent on preparing to exam			
Other – preparing to final test		15	
Student's workload in total		89	
ECTS credits for the subject (in total)	3		
Remarks			

* Selected examples of methods of assessment:

EP – written examination

EU – oral examination

ET – test examination

EPR – practical examination

K – colloquium

R – report

S – practical skills assessment

RZC – practical classes report, incl. discussion on results

O – student's active participation and attitude assessment

SL – lab report

SP – case study

PS - assessment of student's ability to work independently

W – entry test

PM – multimedial presentation

other...