



Pomeranian Medical University in Szczecin

SYLLABUS of the MODULE (SUBJECT)

valid from the academic year 2017/2018

General Information

Module title	<i>Biophysics</i>
Module type	<i>Obligatory</i>
Faculty	<i>Faculty of Medicine</i>
Field of study	<i>Medicine</i>
Major	<i>Not applicable</i>
Level of study	long-cycle (S2J)
Mode of study	intramural
Year of studies, semester	<i>Year I, semester 1</i>
ECTS credits (incl. semester breakdown)	2
Type/s of training	<i>seminars (20h)/ practical (10)</i>
Form of assessment	<p>- <i>graded assessment</i>: *</p> <p><input type="checkbox"/> <i>descriptive</i></p> <p><input type="checkbox"/> <i>test</i></p> <p><input type="checkbox"/> <i>practical</i></p> <p><input type="checkbox"/> <i>oral</i></p> <p>X <i>non-graded assessment</i> *</p> <p>- <i>final examination</i>: *</p> <p><input type="checkbox"/> <i>descriptive</i></p> <p><input type="checkbox"/> <i>test</i></p> <p><input type="checkbox"/> <i>practical</i></p> <p><input type="checkbox"/> <i>oral</i></p>
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Language	English

*replace ☐ with X where applicable

Detailed information

Module objectives		<i>Seminars and exercises are designed:</i> <ul style="list-style-type: none">➤ to provide students with the basic issues concerning the physical basis of physiological processes,➤ to become familiar with the physical phenomena in contemporary medical diagnostics and therapy,➤ to have knowledge of the general principles of operation of medical equipment,➤ to have knowledge of the mechanisms of action of physical factors on body.	
Prerequisite /essential requirements	Knowledge	Knowledge of physics and mathematics from the high school.	
	Skills	The student is able to define and estimate the measurement error, graphically presents the results of measurements, knows basic math functions, exponents and logarithms.	
	Competences	The openness to knowledge, willingness to cooperate in a group, awareness of high requirements of future doctor.	
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 the physical laws describing the flow of fluids and factors affecting the vascular resistance of a blood flow	K_B.W5	K, RZĆ
W02	knows natural and artificial sources of ionizing radiation and its interaction with matter	K_B.W6	K, RZĆ
W03	knows the physico-chemical and molecular actions of the organs of senses	K_B.W7	K, RZĆ
W04	knows the physical basis of non-invasive imaging methods	K_B.W8	K,
W05	knows the physical principles of selected therapeutic techniques, including ultrasound and radiation	K_B.W9	K, RZĆ
W06	knows the possibilities of the modern telemedicine as a tool to support the work of a doctor	K_B.W33	K,
U01	uses knowledge of the laws of physics to explain the impact of external factors such as temperature, acceleration, pressure, electromagnetic fields and ionizing radiation on the body	K_B.U1	RZĆ, SL
U02	able to assess the harmfulness of ionizing radiation dose and apply the principles of radiation protection	K_B.U2	RZĆ, SL
U03	uses simple measuring instruments and evaluates the accuracy of measurement taken	K_B.U10	RZĆ, SL
U04	uses databases, including on-line bases and searches for information required by means of available tools	K_B.U11	RZĆ, SL
U05	designs and conducts simple research projects and interprets their outputs and	K_B.U14	RZĆ, SL

	draws conclusions		
K01	recognizes concept and need for responsibility for property he/she has been entrusted with	K_K02	O
K02	demonstrates the awareness for self education, understands the need for continuing professional education, can inspire and organize learning processes in others	K_K03	O
K03	co-operates with team members; can co-operate within a group and take different roles	K_K04	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.W5	X							
2.	K_B.W6	X							
3.	K_B.W7	X		X					
3.	K_B.W8	X							
4.	K_B.W9	X		X					
5.	K_B.W33	X							
6.	K_B.U1	X		X					
7.	K_B.U2			X					
8.	K_B.U10			X					
9.	K_B.U11			X					
10.	K_B.U14			X					
11.	K_K02			X					
12.	K_K03			X					
13.	K_K04			X					
14.	K_B.W5	X							

Module (subject) contents no.	Description of teaching programme	No. of hours	References to learning outcomes
	Seminars:		
TK01	<i>Medical technology in the twenty-first century (telemedicine, robotics, computerization). The use of low temperature plasma in medicine.</i>	2	W05, W06
TK02	<i>Ultrasonic techniques - basic concepts, the diagnostic and therapeutic use</i>	2	W05, W04, U01, U03, U04, K01, K02, K03.
TK03	<i>Lasers and their applications in medicine</i>	2	W04, U01, U04, K01, K02, K03
TK04	<i>Electricity and magnetism. Cellular electrophysiology.</i>	2	W03, U01, U03, U04,

	<i>Transmembrane ion transport. Active transport. Transmission of information in the body.</i>		K01, K02, K03.
TK05	<i>Ionizing radiation in medicine and radiation protection.</i>	2	W02, U01, U02, U03, K01, K02, K03.
TK06	<i>Biophysics of cardiovascular and respiratory systems.</i>	2	W01, U01, U04, K01, K02, K03.
TK07	<i>Modern imaging methods (MRI, PET, ultrasound, CT, thermography).</i>	2	W04, U04, K02.
TK08	<i>Biophysics of the process of vision and hearing.</i>	2	W03, U01, U02, U04, K01, K02, K03.
TK09	<i>The impact of the physical environment on living organisms, the possibility of physical therapy.</i>	2	W05, U01, U04, K02.
TK10	<i>Colloquium</i>	2	
	Practical classes:		
TK01	<i>Optical properties of the matter. Polarimetry and refractometry measurements.</i>	2	W04, U01, U03, U04, K01, K02, K03
TK02	<i>Spectroscopy and microscopy.</i>	2	W04, U03, U05
TK03	<i>The use of the impedance methods in medicine. Diffusion potentials measurement across an artificial membrane.</i>	2	W03, U01, U03, U04, K01, K02, K03.
TK04	<i>Thermal and mechanical effect identification and measurement in the water treated by the ultrasound. Physics of the ear and hearing, audiometry measurements</i>	2	W05, W04, U01, U03, U04, K01, K02, K03.
TK05	<i>Ionizing radiation. Determination of the linear and mass attenuation coefficient for different materials. Virtual laboratory on ionizing radiation with the help of WOPsimulator.</i>	2	W02, U01, U02, U03, K01, K02, K03.

Booklist

Obligatory literature:

1. Cameron J., Skofronick J.G., Grant R.M.: *Physics of the Body*, Medical Physics Publishing 1992
2. Tuliszką M.: *Biophysics, Laboratory Textbook*, Poznań 1997

3. Kirsten Franklin, Paul Muir, Terry Scott, Lara Wilcocks and Paul Yates, "Introduction to Biological Physics for the Health and Life Sciences", 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	35		
Time spent on preparation to seminars/ practical classess	5		
Time spent on reading recommended literature	5		
Time spent on writing report/making project	5		
Time spent on preparing to colloquium/ entry test			
Time spent on preparing to exam	2		
Other			
Student’s workload in total	52		
ECTS credits for the subject (in total)	2		
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

RZĆ – 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...