Appendix number 1.5 to The Rector UR Resolution No. 12/2019

SYLLABUS

concerning the cycle of education 2023-2029

(date range)

1.1. BASIC INFORMATION CONCERNING THIS SUBJECT / MODULE

Subject / Module	Biophysics
Course code / module *	Bf / B
Faculty of (name of the leading direction)	Medical College of Rzeszów University
Department Name	Medical College of Rzeszów University
Field of study	medical direction
Level of education	uniform master's studies
Profile	practical
Form of study	stationary / extramural
Year and semester	year II, semester III
Type of course	Mandatory
Coordinator	Dr hab. M. Cholewa
First and Last Name of the Teacher	Dr hab. M. Cholewa dr Wioletta Paśko dr Sylwia Budzik

* - According to the resolutions of the Faculty of Medicine

1.2. Forms of classes, number of hours and ECTS

Lecture	Exercise	Conversation	Laboratory	Seminar	ZP	Practical	Self-learning	**Number of points ECTS**
15	15	-	-	15	-	-	-	**4**

1.3. The form of class activities

☒classes are in the traditional form

☐classes are implemented using methods and techniques of distance learning

1.4. Examination Forms / module (exam, **credit with grade** or credit without grade)

2. REQUIREMENTS

Physics in the field - extended level. Biology: human biology - advanced level.

3. OBJECTIVES, OUTCOMES, AND PROGRAM CONTENT USED IN TEACHING METHODS

3.1. Objectives of this course/module

C1	Mastering the theoretical basis of physical phenomena occurring in the human body.
C2	Understanding the physical processes occurring and used in medicine.

3.2 OUTCOMES FOR THE COURSE / MODULE (TO BE COMPLETED BY THE COORDINATOR)

EK (the effect of education)	The content of the learning effect defined for the subject (module)	Reference to directional effects (KEK)
EK_01	He knows physical laws describing the flow of liquids and factors affecting the vascular resistance of blood flow	B.W5
EK_02	He knows natural and artificial sources of ionizing radiation and its interaction with matter	B.W6
EK_03	He knows the physical basis of non-invasive imaging methods	B.W8
EK_04	He knows the physical basis of selected therapeutic techniques, including ultrasound and irradiations	B.W9
EK_05	Uses knowledge of the laws of physics to explain the influence of external factors, such as temperature, acceleration, pressure, electromagnetic field and ionizing radiation, on the body and its components	B.U1
EK_06	Is able to assess the harmfulness of non-ionizing radiation dose, ionizing dose and other physical factors acting on the body and applies to the principles of radiation protection	B.U2

3.3 CONTENT CURRICULUM (filled by the coordinator)

A. Lectures

Course contents of lectures
Methods for the development of experimental data. Basics of error theory.
Physical basics of ultrasonography
Rentgenodiagnostics.
X-ray computed tomography.
NMR imaging.
Positron emission tomography.
Influence of electric and magnetic fields on the living organism.
The influence of ionizing radiation on the body of live radiotherapy.

B. Exercises

Course contents of the exercises
Determination of work and examination of the distribution of forces in the skeletal-muscular lever model.
Basics of bioreology. Rheological measurements.
Application of isotopic techniques in medicine.
Basics of hemodynamics.

Physical basis of biospectroscopy in the field
Molecular refraction and torsion angle analysis
Biophysical basis of physiological optics.
Basics of medical thermometry.

C. **Seminars**

Course contents
Solid matter. Molecular structure. Bioacoustics.
Biophysics of the respiratory system. Biophysical methods of molecular research.
Basics of biothermodynamics.
Basics of cell biophysics. The influence of some physical factors on the body.
Physical methods in therapy. Magnetic properties of bodies.

3.4 TEACHING METHODS

Multimedia lecture (method giving as a supplement to the problem method)

Exercises: working in groups

Seminar: attempts to solve problems

4 METHODS AND EVALUATION CRITERIA

4.1 Methods of verification of learning outcomes

Symbol of effect	Methods of assessment of learning outcomes (Eg.: tests, oral exams, written exams, project reports, observations during classes)	Form of classes
EK_ 01	Examination	Lectures, Exercise, Seminars
EK_ 02	Examination	Lectures, Exercise, Seminars
EK_ 03	Examination	Lectures, Exercise, Seminars
EK_ 04	Examination	Lectures, Exercise, Seminars
EK_ 05	Examination	Lectures, Exercise, Seminars
EK_ 06	Practical pass	Exercise, Seminars
EK_ 01	Practical pass	Exercise, Seminars

4.2 Conditions for completing the course (evaluation criteria)

Classes, seminars (EK_ 01, EK_ 02, EK_03, EK_04, EK_05, EK_06):
1. full participation and activity in the exercises
2. written partial credits. Scope of marks: 2.0 -5.0
Lectures (EK_ 01, EK_ 02, EK_03, EK_04):
1. test pass and open questions:
A: Questions in the field of messages to remember;
B: Questions in the field of speech to understand;
C: Solving a typical written task; D: Solving an atypical writing task;
- for insufficient solution of tasks only from areas A and B = score 2.0
- for solving tasks only from areas A and B, the possibility of obtaining max. rating 3.0
- for solving tasks from the area A + B + C, the possibility of obtaining max. evaluation 4.0
- for the solution of tasks in the area A + B + C + D, the possibility of obtaining a rating of 5.0

Knowledge assessment:
Written or oral colloquium
5.0 - has knowledge of the education content at the level of 93% -100%
4.5 - has knowledge of the content of education at the level of 85% -92%
4.0 - has knowledge of the content of education at the level of 77% -84%
3.5 - has knowledge of the content of education at the level of 69% -76%
3.0 - has knowledge of the content of education at the level of 60% -68%
2.0 - has knowledge of the educational content below 60%

Skill assessment

5.0 - the student actively participates in the classes, recognizes and is able to properly name the biophysical phenomena in the human body, and to assess the correctness of the biophysical functioning of the human body. He skillfully uses basic laboratory techniques, inorganic and organic compounds

4.5 - the student actively participates in the classes, with little help from the teacher he recognizes and is able to properly name the biophysical phenomena in the human body, and to assess the correctness of the biophysical functioning of the human body. He uses basic laboratory techniques for inorganic and organic compounds

4.0 - the student actively participates in classes, with minor corrections of the teacher, committing minor mistakes in the recognition of biophysical phenomena in the human body. He uses laboratory techniques well, inorganic and organic compounds

3.5 - the student participates in classes, with numerous corrections and teacher's instructions recognizes and is able to correctly name biophysical phenomena in the human body, often making mistakes while using laboratory techniques, inorganic and organic compounds

3.0 - the student participates in classes, with very many corrections and teacher's instructions recognizes and is able to properly name biophysical phenomena in the human body, very often making mistakes while using laboratory techniques, inorganic and organic compounds

2.0 - the student passively participates in classes, commits blatant errors in the diagnosis and proper naming of biophysical phenomena, improperly uses laboratory techniques, committing repeatedly numerous errors, organic and inorganic compounds

5. Total student workload required to achieve the desired result in hours and ECTS credits

Activity	Hours / student work

Hours of classes according to plan with the teacher	45
Preparation for classes	25
Participation in the consultations	2
The time to write a paper / essay	-
Preparation for tests	30
Participation in colloquia	2
Other (e-learning)	
SUM OF HOURS	104
TOTAL NUMBER OF ECTS	4

6. TRAINING PRACTICES IN THE SUBJECT / MODUL

Number of hours	-
Rules and forms of apprenticeship	-

6. LITERATURE

READING:

Biofizyka : podręcznik dla studentów / pod red. Feliksa Jaroszyka ; aut. Helena Gawda [i in.]. - Wyd. 1 (dodr.). - Warszawa : Wydaw. Lekarskie PZWL, 2002.
Biofizyka : wybrane zagadnienia wraz z ćwiczeniami / red. nauk. Zofia Jóźwiak, Grzegorz Bartosz ; Wyd. 1, 3 dodr. - Warszawa : Wydawnictwo Naukowe PWN, 2012.
Podstawy biofizyki : podręcznik dla studentów medycyny / pod red. Andrzeja Pilawskiego ; [współaut. Ryszard Bilski i in.]. - Wyd. 4 popr. i uzup. - Warszawa : Państwowy Zakład Wydawnictw Lekarskich, 1985.
Materiały do ćwiczeń z biofizyki i fizyki : podręcznik dla studentów medycyny / aut. Stanisław Dzierżak [i in.] ; pod red. Bolesława Kędzi. - Wyd. 3. - Warszawa : Państwowy Zakład Wydawnictw Lekarskich, 1982.

Acceptance Unit Manager or authorized person