

**48SJ-BIOP****ECTS: 5****YEAR: 2020Z****BIOPHYSICS****BIOPHYSICS****COURSE CONTENT
CLASSES**

M2. Ionizing radiation. Determination of linear and mass absorption coefficient of gamma rays for different materials. M3. Electrical activity of the heart. Electrocardiography. Determination of the heart's electrical vector. M12. Laminar and turbulent flow. Measurement of fluid viscosity. M5. The sense of hearing. Measures of auditory threshold. M6. Physical principles of ultrasound in medicine. Ultrasonography. Determination of blood pressure. M7. Modeling the electrical properties of biological objects. Examination of serial RLC circuit. M8. The phenomenon of absorption and emission of light in analysis. Measurement of absorption spectra and the concentration of riboflavin in aqueous solutions using a spectrophotometer. Determination of concentrations of substances in solution using fluorescence. M9. Optical rotation of solutions. Measurement of the concentration of optically active substances by using a polarimeter. M10. Determination of changes of thermodynamic function of state. Determination of changes in the entropy of the system. Determination of enthalpy change in the process of dissolving salt.

LECTURES

1. MECHANICS OF THE BODY 1.1 Skeleton, forces, and body stability 1.2 Muscles and the dynamics of body movement 1.3 Physics of body crashing 2. ENERGY HOUSEHOLD OF THE BODY 2.1 Energy balance in the body 2.2 Energy consumption of the body 2.3 Heat losses of the body 3. PRESSURE SYSTEM OF THE BODY 3.1 Physics of breathing 3.2 Physics of the cardiovascular system 4. ACOUSTICS OF THE BODY 4.1 Nature and characteristics of sound 4.2 Production of speech 4.3 Physics of the ear 4.4 Diagnostics with sound and ultrasound 5. OPTICAL SYSTEM OF THE BODY 5.1 Physics of the eye 6. ELECTRICAL SYSTEM OF THE BODY 6.1 Physics of the nervous system 6.2 Electrical signals and information transfer

EDUCATIONAL OBJECTIVE:

Transfer of knowledge about physical laws and phenomena with particular application in medicine. Development of personal abilities towards self-education in the category of application of physical methods. Ability of performing simple physical experiments, assessment of precision of physical measurements and discussion. Development of common work in group.

**DESCRIPTION OF LEARNING OUTCOMES FOR THE COURSE IN RELATION TO FIELD AND MAJOR
LEARNING OUTCOMES**

Codes of learning outcomes in a major field of study: M/NM+++, M/NMA_P7S_KR+,

Codes of learning outcomes in a major area of study: B.U1.+ , B.U10.+ , B.U2.+ , B.U9.+ , B.W5.+ , B.W6.+ , B.W7.+ , B.W8.+ , B.W9.+ , E.U24.+ , K.5+ , K.9.+ , KA7_KR1+ ,

LEARNING OUTCOMES:**Knowledge**

W1 - Understanding physical phenomena and processes and their connection with functioning of living organisms.

Skills

U1 - Can perform simple observations in open area or in the laboratory.

U2 - selfstudy of biophysics

Social competence

K1 - Is able to perform any role in the team.

BASIC LITERATURE

1) Halliday D., Fundamentals of Physics Extended 8ed, , wyd. John Wiley & Sons, 2008 ; 2) R. K. Hobbie, B. J. Roth, Intermediate Physics for Medicine and Biology 4ed, wyd. Springer, 2007

SUPPLEMENTARY LITERATURE**Course/module:**

Biophysics

Fields of education:**Course status:** mandatory**Course group:** A - przedmioty podstawowe**ECTS code:** 132SJ-3-A**Field of study:** Medicine**Specialty area:** Medicine**Educational profile:** General academic**Form of study:** full-time**Level of study:** uniform master's studies**Year/semester:** 1 / 1**Type of course:**

Classes, Seminar, Lecture

Number of hours per semester/week: Classes: 30, Seminar: 10, Lecture: 15**Teaching forms and methods**

Classes(K1, U1, U2, W1) : performance of experiments and the analysis of data, Seminar(U2, W1) : oral presentations, Lecture(U2, W1) : lecture with multimedial support

Form and terms of the verification results:

CLASSES: Write-up - null(K1, U1, U2, W1) ; CLASSES: Written test - null(U2, W1) ; SEMINAR: Presentation - null(U2, W1) ; LECTURE: Written exam - null(U2, W1)

Number of ECTS points: 5**Language of instruction:** English**Introductory courses:**

mathematics

Preliminary requirements:

no

Name of the organizational unit offering the course:

Katedra Fizyki i Biofizyki,

Person in charge of the course:

dr hab. Krzysztof Bryl, prof. UWM

Course coordinators:

dr hab. Krzysztof Bryl, prof. UWM, dr hab. Mariusz Szabelski, prof. UWM, mgr Maciej Pyrka, , dr hab. Bogdan Smyk, prof. UWM, dr hab. Maciej Maciejczyk, prof. UWM, dr inż. Monika Pietrzak, , dr Adam Kasparek,

Notes:

no

Detailed description of the awarded ECTS points - part B

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BIOPHYSICS
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The awarded number of ECTS points is composed of:

1. Contact hours with the academic teacher:

- participation in: classes	30 h.
- participation in: seminar	10 h.
- participation in: lecture	15 h.
- consultation	5 h.
	60 h.

2. Student's independent work:

- selfpreparation to examination	45 h.
- selfpreparation to labs and seminars	20 h.
	65 h.

1 ECTS point = 25-30 h of the average student's work, number of ECTS points = 125 h : 25 h/ECTS = 5,00 ECTS
on average: **5 ECTS**

- including the number of ECTS points for contact hours with direct participation of the academic teacher:	2,40 ECTS points,
- including the number of ECTS points for hours completed in the form of the student's independent work:	2,60 ECTS points,