



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Biophysics

Course

Field of study

Biomedical Engineering

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

Tutorials

15

Projects/seminars

Other (e.g. online)

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Dawid Kucharski, PhD Eng.

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Systems,

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Responsible for the course/lecturer:

Prerequisites

Basic knowledge of physics, mathematics. Ability to physically describe a biological system.

Course objective

Getting to know the fundamentals of biophysics, physics of a biological cells and solving the logical biophysical tasks.

Course-related learning outcomes

Knowledge

A student knows the fundamentals of mathematics and the ability to use it for a biophysical description of a living system. Based on physical laws and theory, a student should do an interpretation of a selected human internal organs functions. A student should know a selected method of structure cells and a tissues investigation, together with physiological processes. A student has an elementary knowledge about chemistry and can adapt it for a biological systems description.

Skills

A student can: observe physical phenomena inside the human body; describe biophysical problems and can merge them into technical issues; do the measurements and compute the biophysical quantities.

Social competences

A student understands a whole life learning necessity.

A student can collaborate with others.

A student knows the necessity of an interdisciplinary way for the bioengineering problems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

course final exam; written (5 questions) and classes exam (4 tasks to solve)

Programme content

Lectures scope:

Structure of matter, Elements of quantum physics, Biological structures. Fundamentals of biothermodynamics, Physical properties of a cell membrane. Molecular and ionic transport. Diffusion and osmosis. Information transport through a cell membrane. External-field-body interaction. Radiation-matter interaction. Biophysics of the senses. Elements of biomechanics of muscles and biological liquids.

Classes scope: computational tasks (about lectures scope)

Teaching methods



1. Lectures: oral presentation with illustrated examples on a blackboard, calculations.
2. Classes: tasks calculations.

Bibliography

Basic

1. F. Jaroszyk, Biofizyka, Wydawnictwo Lekarskie PZWL, Warszawa 2001.
2. Z. Józwiak, G.Bartosz (red.), Biofizyka. Wybrane zagadnienia wraz z ćwiczeniami, PWN, Warszawa 2003.

Additional

1. I. Herman, Physics of the Human Body, Springer Science & Business Media, Berlin, Heidelberg (2007).
2. M. Ashrafuzzaman and J. A. Tuszynski, Membrane Biophysics, Springer Science & Business Media (2012).

Breakdown of average student's workload

| | Hours | ECTS |
|--|-------|------|
| Total workload | 80 | 3,0 |
| Classes requiring direct contact with the teacher | 47 | 2,0 |
| Student's own work (literature studies, preparation for tutorials, tests and exam ¹ | 33 | 1,0 |

¹ delete or add other activities as appropriate