

Biophysics (1st Year of study, 1st Semester)

Credit value (ECTS) 3

Course category

Fundamental (Mandatory)

Course holder:

Iuliana MOTRESCU, Lecturer Ph.D.

Discipline objectives (course and practical works)

During the course the students acquire basic and latest information in the field of biophysics that directly impact on their future professional skills: learn about the basic principles of the physical phenomena governing the living organisms and the interactions of living organisms with the environment, principles of thermodynamics and energy transfer in living organisms, develop skills for operating different devices used for laboratory analysis of biological samples, and develop skills for data analysis and discussion of experimental results.

Contents (syllabus)

Course (chapters/subchapters)
Molecular biophysics. Surface and contact phenomena: surface tension and capillarity. Applications. Transport phenomena: viscosity, diffusion, osmosis. Applications.
Cell biophysics. Membrane biophysics. The functions of cell membrane. Membrane transport. Ionic channels and ion pumps. Examples.
Biological thermodynamics. Thermodynamic systems, states and processes. Laws of thermodynamics and applications. Open systems. Applications in biology.
Radiobiology of non-ionizing radiation. Oscillations and waves. Electromagnetic spectrum. The effects of non-ionizing radiations upon the living organisms
Radiobiology of ionizing radiation. Natural and artificial radioactivity. The effects of ionizing radiation on living organisms. Radioactive isotopes and applications. Radioprotection.
Physical basis of analysis methods. Separation techniques (sedimentation, centrifugation, chromatography, etc.) Spectral analysis (absorption, infrared based techniques, energy dispersive X-ray spectroscopy), Electron microscopy

Practical works
Interpretation of experimental data
Measuring the liquid conductivity using Kohrlausch bridge
Measuring the refractive index with the refractometer
Measuring the focal length of a convergent thin lens
Determining the refractive index of a material using the microscope
Determining the sugar content using Laurent polarimeter
Study of the absorption spectrum of chlorophyll

Bibliography

1. Stefanescu C., Rusu V., *Medical Biophysics. An introduction for students*, Ed. Tehnopress, Iasi, 2008.
2. Davidovits P., *Physics in Biology and Medicine* 3rd edition, Elsevier, 2008.
3. Amadir Kane S., *Introduction to Physics in Modern Medicine* second edition, CRC Press Taylor & Francis Group, LLC, 2009.
4. Sybesma Chr., *Biophysics*, Kluwer Academic Publishers, Dordrecht, Boston, London, 1989.
5. Popescu Aurel, *Fundamentele biofizicii medicale*, Ed. All, Bucuresti, 1994
6. Rusu Florin, *Biofizica*, Centrul de Multiplicare al Institutului Agronomic, 1988
7. Dimoftache C si S. Herman, *Principii de Biofizica Umana*, Editura Universitara Carol Davila, Bucuresti, 2003.
8. Eremia D., *Curs de Biofizica Medicala*, Editura universitara Carol Davila;, Bucuresti, 1993
9. Luchian, T., *Introducere in Biofizica Moleculara si Celulara*, Editura Universitatii Ioan Cuza, Iasi,2001
10. I. Motrescu, *Îndrumar de lucrări practice*, Editura Societății Academice Matei-Teiu Botez, Iași 2015.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Written examination	70%
Appreciation of the activity during the semester	Oral and written assessment during the semester and verification tests	30%

Contact

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