Physics (Ist Year of study, Ist Semester)

Credit value (ECTS) 5

Course category
Fundamental (Mandatory)

Course holder:
Iuliana MOTRESCU, Lecturer Ph.D.

Discipline objectives (course and practical works)

- fundamental physical quantities, quantities used to describe the studied phenomena, measuring units, multiples, conversions
- physical phenomena on which the functioning of living organism is based on
- the interactions between different physical factors and the living organisms, directly related with some methods used in medicine
- the physical principle of some analysis methods used in medicine
- using the laboratory equipment, performing measurements, analysing and interpreting experimental results

Contents (syllabus)

Course (chapters/subchapters)
Physical quantities and measuring units Fundamental quantities, measuring units, multiples, conversions
Mechanics Principles of the Newtonian mechanics. Types of movement. Surface and contact phenomena: surface tension and capillarity. Applications. Transport phenomena: viscosity, diffusion, osmosis. Applications.
Thermodynamics Thermodynamic systems, states and processes. Laws of thermodynamics and applications. Heat transfer.
Electricity Electrostatics. Electric currents. Circuits. Ohm's law. Kirchhoff's laws. Equivalent circuits.
Oscillations and waves Oscillations and waves. Electromagnetic spectrum. Non-ionizing radiations and their interaction with matter. Ionizing radiations. Natural and artificial radioactivity. The interaction of ionizing radiations with matter. 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), Mass spectroscopy

Practical works
Interpretation of experimental data
Measuring the surface tension of some liquids using the counting drop method
Measuring the relative viscosity of a liquid
Measuring the dynamic viscosity of a liquid based on Stokes law
Measuring the electrical conductibility of an ionic liquid using Kohlrausch bridge
Measuring the refractive index of a material using the microscope
Measuring the focal length of a thin convergent lens
Measuring the sugar content of a solution using the polarimeter
Studying the thermal radiation. Stefan-Boltzmann law
Measuring the specific heat of water
The thermocouple
Measuring the adiabatic index using Clement-Desormes method
Detection of nuclear radiation
Measuring the fractal length

Bibliography

1. Lecture notes
2. Stefanescu C., Rusu V., Medical Biophysics. An introduction for students, Ed. Tehnopress, Iasi, 2008.
3. Davidovits P., Physics in Biology and Medicine 3rd edition, Elsevier, 2008.
4. Amadir Kane S., Introduction to Physics in Modern Medicine second edition, CRC Press Taylor & Francis Group, LLC, 2009.
5. Sybesma Chr., Biophysics, Kluwer Academic Publishers, Dordrecht, Boston, London, 1989.

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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