1st semester

Physical foundations of biophysics - elective course

Duration of the course: 2st-13th week
Time: Tuesdays 18:00-20:15 **and** Thursdays 18:00-20:15

Week	Date	Title	Lecturer	Location
2	16, Sept Tuesday	Reference frame, Cartesian coordinate system, scalars, vectors, vector notation and coordinate notation. Position, velocity, acceleration, mass. Linear momentum, force, kinetic energy, work, power. Gravitational force, potential energy. Newton's laws. Conservation of linear momentum and mechanical energy. Elastic and inelastic collision. Example of inelastic collision: Compton-scattering.	GV	IVDI
	18, Sept Thursday			IVDI
3	23, Sept Tuesday	Other types of physical interaction: electric, magnetic, strong. Introduction to wave phenomena.	FZS	IVDI
	25, Sept Thursday			IVDI
4	30,Sept Tuesday	Bohr's model of the atom. Quantum numbers. Quantization of energy levels, absorption and emission spectra of atoms and molecules	NE	IVDI
	2, Oct Thursday			IVDI
5	7, Oct Tuesday	Longitudinal and transversal waves. Sound, light	BZs	IVDI
	9, Oct Thursday			IVDI
6	14, Oct Tuesday	Differential equations describing radioactive decay, absorption of gamma/X rays. Connection between proton-to-neutron ratio and type of radioactive decay. Mathematical basis of target theory.	HP	IVDI
	16, Oct Thursday			IVDI
7	21, Oct Tuesday	Physical basis of PET, SPECT, gamma-camera: pair production, annihilation.	GK	IVDI
	23, Oct Thursday			
8	28, Oct Tuesday	Angular momentum, magnetic momentum, spin. Quantization of angular momenta. Potential energy of a magnetic dipole in a magnetic field, potential energy of an electric dipole in an electric field. Quantization of energy. Bases of NMR and ESR spectroscopy.	KT	IVDI
	30, Oct Thursday			IVDI
9	4, Nov Tuesday	Various forms of energy. Absolute temperature, the Kelvin scale. Energy storing degrees of freedom, connection between energy and temperature, the equipartition principle. Work and heat. Thermodynamic state functions. Kinetic gas theory, ideal gas, state equation of the ideal gas. The first law of thermodynamics.	GV	IVDI
	6, Nov Thursday			IVDI
10	11, Nov Tuesday	Microstates. Thermodynamic probability. Entropy. The second law of thermodynamics. Chemical and electrochemical potential. Distribution of energy among particles – the Boltzmann distribution.	BL	IVDI
	13, Nov Thursday			IVDI
11	18, Nov Tuesday	Electric charge, electric field and potential of a point charge, Coulomb-force. (Gauss's law.) Electric field and potential in a capacitor. Potential energy of an electric charge in an electric field. Electrochemical potential.	VZ	IVDI
	20, Nov Thursday			IVDI
12	25, Nov Tuesday	Geometrical optics.	VGy	IVDI
	27, Nov Thursday			IVDI
13	2, Dec Tuesday	Circular motion, angular velocity, centripetal acceleration. Force in a rotating reference frame: centrifugal force. Drag force. Buoyant force. The physics of centrifuging.	NE	IVDI
	4, Dec Thursday			IVDI

Physical foundations of biophysics (elective course)
The aim of the course is to provide students with a background in physics, which helps them to understand and learn the material of the biophysics lectures.

Type of the course: **seminars and consultation**
Requirements of admission: **sign up for Biophysics for the same semester**
Credit points: **1**

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Time: Tuesdays 18-20[15] and Thursdays 18-20[15]
Coordinator: Dr. György Vámosi, Room 1.407, Life Science Bldg.

Az órák bevezető részében az előadásokhoz kapcsolódó alapfizikai ismeretekkel kellene foglalkozni (~45-60 perc), a fennmaradó időben a biofizika és biostatisztika anyaggal kapcsolatos kérdésekre kellene válaszolni. Az a jó, ha az idő nagyobb része konzultációval telik el.