

Biophysics lecture curriculum
Autumn semester

Week	Date	Number	Title	Lecturer	Seminar			Teacher3
					Topic	Teacher1	Teacher2	
1	8 Sept (Med)	1	Introduction. Electromagnetic waves , the properties of light (interference, photoelectric effect, photon theory). Matter waves. Thermal radiation.	NP	Intro	NE	FZS	
	10, Sept (Dent)	2	Generation and absorption of X-ray, X-ray crystallography.	JA				
2	8, Sept (Med)							
	12, Sept (Dent)							
2	15, Sept (Med)	3	Molecular spectra, Jablonski diagram, fluorescence, fluorescence applications.	JA	1-2	JA	VáGy	ZF
	17, Sept (Dent)							
3	15, Sept (Med)	4	Sedimentation and electrophoresis. Mass spectrometry.	SZGT	3-4	JA	SzGT	KT
	19, Sept (Dent)							
3	22, Sept (Med)	5	Lasers and their application in biology and medicine.	VGy	3-4	JA	SzGT	KT
	24, Sept (Dent)	6	Optics, optical microscopy, electron microscopy.	VGy				
4	22, Sept (Med)							
	26, Sept (Dent)							
4	29, Sept (Med)	7	Physical properties of sound, ultrasound. Doppler effect. Medical and biological applications of ultrasound.	GK	5-6	VGy	SzJ	SzöÁ
	1, Oct (Dent)	8	Nuclear physics. Nuclear binding energy, radioactivity, law of radioactive decay, radioactive series.	HP				
5	29, Sept (Med)							
	3, Oct (Dent)							
5	6, Oct (Med)	9	Features of nuclear radiation and its interaction with absorbing material. Detection of radiation.	SzJ	7-8	KT	HP	NE
	8, Oct (Dent)	10	Radiation biophysics: target theory, direct and indirect action of radiation. Dosimetry. Biological effects of radiation.	KT				
6	6, Oct (Med)							
	10, Oct (Dent)							
6	13, Oct (Med)	11	Experimental, diagnostic and therapeutic application of isotopes. Accelerators.	DBA	9-10 for MB_E: 1-10	GK	VGy MB_E: FZs	SzöÁ
	15, Oct (Dent)	12	Basic principles of nuclear magnetic resonance, NMR spectroscopy in biology and medicine.	DBA				
7	17, Oct (Dent)							
7	1st SCT Lectures 1-10, week7, 20 October							
7	20, Oct (Med) (Dent)	13	Principles of tomographic methods. X-ray absorption CT. PET.	NP	11-12	DBA	NP	ZF
	20 Oct (Med) (Dent)	14	Magnetic resonance imaging (MRI). Gamma camera, SPECT.	NP				
8	27, Oct (MED, DENT)	15	Chemical potential. Brownian motion. Diffusion at the molecular level, statistical interpretation. Fick's laws. Osmosis.	VáGy	13-14	NP	BZs	KT
	27, Oct (MED, DENT)	16	The structure of biological membranes. Membrane transport.	VáGy				
9	3, NOV (Med, Dent)	17	Thermodynamic equilibrium potentials (Nernst, Donnan). Diffusion potential, Goldman-Hodgkin-Katz equation.	VZ	15-16	VáGy	SzöÁ	NE
	3, NOV (Med, Dent)	18	Ion channels (gating, selectivity), the "patch clamp" technique.	VZ				
10	10, Nov (Med, Dent)	19	Resting potential, action potential, and electrical excitability. Measurement of membrane potential.	PGy	17-18 for MB_E: 11-18	VZ MB_E: FZs	PF	NE
	10, Nov (Med, Dent)	20	The physical background of ECG and EEG.	PGy				
11	2nd SCT Lectures 1-18, approx. 90% of the questions will focus on topics not included in the 1st SCT. Week11, 17 November							
11	17, Nov (Med, Dent)	21	The human ear. Mechanism of hearing. The Weber-Fechner law.	NP	19-20	VZ	PGy	FZs
	17, Nov (Med, Dent)	22	The human eye. Photoreceptors. The molecular mechanism of vision.	SzG				
12	24, Nov (Med, Dent)	23	Fluid mechanics, blood circulation.	ZF	21-22	SzG	PGy	SzöÁ
	24, Nov (Med, Dent)	24	Flow cytometry. Confocal laser scanning microscopy.	ML				
13	1, Dec (Med, Dent)	25	Biophysics of respiration. (not compulsory for dentistry students)	SzöÁ	23-24	ML	ZF	KT
	1, Dec (Med, Dent)	26	Biomechanics. (not compulsory for dentistry students)	BZs				
14	8, Dec (Med)	27	Modern microscopic techniques (atomic force microscopy, super resolution microscopy). (not compulsory for dentistry students)	ML	25-26 for MB_E: 19-27	DBA MB_E: FZs	ML	ZF
	8, Dec (Med)	28	Research in the Institute. (not compulsory for dentistry students)	PGy				

Biophysics Lecture:

GM, MB_E: Monday, 12:00-14:00 (LSB F.015-016)
Dent: Wednesday, 14:00-15:00, (LSB F 003-004) (weeks 1-7), Friday, 10:00-11:00 (LSB F.003-004) (weeks 1-7),
Dent: , Monday, 12:00-13:00 (LSB F.015-016) (weeks 8-14) Monday, 13:00-14:00 (LSB F.015-016) (weeks 8-14)