

Biophysics lecture curriculum
Autumn semester

Week	Date	Number	Title	Lecturer	Seminar			
					Topic	Teacher1	Teacher2	
1	7 Sept (Med)	1	Introduction. Electromagnetic waves , the properties of light (interference, photoelectric effect, photon theory). Matter waves. Thermal radiation.	NP	Intro	NE	FZS	
	9, Sept (Dent)							
	7, Sept (Med)	2	Sedimentation and electrophoresis. Mass spectrometry.	NP				
	11, Sept (Dent)							
2	14, Sept (Med)	3	Generation and absorption of X-ray, X-ray crystallography.	JA	1-2	JA	VáGy	
	16, Sept (Dent)							
	14, Sept (Med)	4	Molecular spectra, Jablonski diagram, fluorescence, fluorescence applications.	JA				
	18, Sept (Dent)							
3	21, Sept (Med)	5	Lasers and their application in biology and medicine.	VGy	3-4	JA	SzGT	
	23, Sept (Dent)							
	21, Sept (Med)	6	Optics, optical microscopy, electron microscopy.	VGy				
	25, Sept (Dent)							
4	28, Sept (Med)	7	Physical properties of sound, ultrasound. Doppler effect. Medical and biological applications of ultrasound.	GK	5-6	VGy	SzJ	
	30,Sept (Dent)							
	28, Sept (Med)	8	Nuclear physics. Nuclear binding energy, radioactivity, law of radioactive decay, radioactive series.	HP				
	2,Oct (Dent)							
5	5 Oct (Med)	9	Features of nuclear radiation and its interaction with absorbing material. Detection of radiation.	SzJ	7-8	GK	HP	
	7, Oct (Dent)							
	2, Oct (Med)	10	Radiation biophysics: target theory, direct and indirect action of radiation. Dosimetry. Biological effects of radiation.	NP				
	9, Oct (Dent)							
6	12, Oct (Med)	11	Experimental, diagnostic and therapeutic application of isotopes. Accelerators.	DBA	9-10 for MB_E: 1-10	KT	VGy+SzJ, MB_E: FZs	
	14, Oct (Dent)							
	12, Oct (Med)	12	Basic principles of nuclear magnetic resonance, NMR spectroscopy in biology and medicine.	DBA				
	16, Oct (Dent)							
7	1st SCT Lectures 1-10, week7, 19 October							
	19 Oct (Med) (Dent)	13	Principles of tomographic methods. X-ray absorption CT, PET.	NP	11-12	DBA	NP	
	19 Oct (Med) (Dent)	14	Magnetic resonance imaging (MRI). Gamma camera, SPECT.	NP				
	8	26,Oct (MED,DENT)	15	Chemical potential. Brownian motion. Diffusion at the molecular level, statistical interpretation. Fick's laws. Osmosis.	VáGy	13-14	NP	BZs
26,Oct (MED,DENT)		16	The structure of biological membranes. Membrane transport.	VáGy				
9		2 NOV (Med, Dent)	17	Thermodynamic equilibrium potentials (Nernst, Donnan). Diffusion potential, Goldman-Hodgkin-Katz equation.	VZ	15-16	VáGy	SzöÁ
		2 NOV (Med, Dent)	18	Ion channels (gating, selectivity), the "patch clamp" technique.	VZ			
	10	9, 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
		9, 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, 16 November						
		16, Nov (Med, Dent)	21	The human ear. Mechanism of hearing. The Weber-Fechner law.	KT	19-20	VZ	PGy
	16 Nov (Med, Dent)	22	The human eye. Photoreceptors. The molecular mechanism of vision.	SzG				
	12	23, Nov (Med, Dent)	23	Fluid mechanics, blood circulation.	ZF	21-22	SzG	PGy
23, Nov (Med, Dent)		24	Flow cytometry. Confocal laser scanning microscopy.	PZ				
13		30, Nov (Med,Dent)	25	Biophysics of respiration. (not compulsory for dentistry students)	SzöÁ	23-24	PZ	ZF
		30, Nov (Med,Dent)	26	Biomechanics. (not compulsory for dentistry students)	BZs			
	14	7 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
		7, Dec (Med)	28	Research in the Institute. (not compulsory for dentistry students)	PGy			

Biophysics Lecture:

GM: 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)