

Biophysics lecture curriculum
Autumn semester, 2023/24

Week	Date	Number	Title	Lecturer	Seminar		
					Topic	Teacher1	Teacher2
1	4 Sept (Med)	1	Introduction. Electromagnetic waves , the properties of light (interference, photoelectric effect, photon theory). Matter waves. Thermal radiation.	NP	Intro	NE	FZS
	6, Sept (Dent)			ZF			
	4, Sept (Med)	2	Generation and absorption of X-ray, X-ray crystallography.	JA	1-2	JA	VáGy
	8, Sept (Dent)			SZGT			
2	11, Sept (Med)	3	Molecular spectra, Jablonski diagram, fluorescence, fluorescence applications.	JA	3-4	JA	SzGT
	13, Sept (Dent)			SZGT			
	11, Sept (Med)	4	Sedimentation and electrophoresis. Mass spectrometry.	SZGT	5-6	VGy	SzJ
	15, Sept (Dent)			NP			
3	18, Sept (Med)	5	Lasers and their application in biology and medicine.	SzöÁ	7-8	GK	HP
	20, Sept (Dent)			NP			
	18, Sept (Med)	6	Optics, optical microscopy, electron microscopy.	NP	9-10	KT	VGy
	22, Sept (Dent)			DBA			
4	25, Sept (Med)	7	Physical properties of sound, ultrasound. Doppler effect. Medical and biological applications of ultrasound.	GK	for MB_E: 1-10	KT	MB_E: FZs
	27, Sept (Dent)			HP			
	25, Sept (Med)	8	Nuclear physics. Nuclear binding energy, radioactivity, law of radioactive decay, radioactive series.	SzJ	11-12	DBA	NP
	29, Sept (Dent)			NP			
5	2, Oct (Med)	9	Features of nuclear radiation and its interaction with absorbing material. Detection of radiation.	SzJ	13-14	NP	DBA
	4, Oct (Dent)			VáGy			
	2, Oct (Med)	10	Radiation biophysics: target theory, direct and indirect action of radiation. Dosimetry. Biological effects of radiation.	KT	15-16	VáGy	SzöÁ
	6, Oct (Dent)			VZ			
6	9, Oct (Med)	11	Experimental, diagnostic and therapeutic application of isotopes. Accelerators.	DBA	17-18	VZ	PF
	11, Oct (Dent)			PGy			
	9, Oct (Med)	12	Basic principles of nuclear magnetic resonance, NMR spectroscopy in biology and medicine.	DBA	for MB_E: 11-18	MB_E: FZs	ML
	13, Oct (Dent)			PGy			
1st SCT Lectures 1-10, week7, 16 October							
7	16, Oct (Med)	13	Principles of tomographic methods. X-ray absorption CT. PET.	NP	19-20	VZ	PGy
	18, Oct (Dent)			SzG			
	16 Oct (Med)	14	Magnetic resonance imaging (MRI). Gamma camera, SPECT.	NP	21-22	SzG	PGy
	20, Oct (Dent)			ML			
8	23, Oct (Med, Dent)	15	Chemical potential. Brownian motion. Diffusion at the molecular level, statistical interpretation. Fick's laws. Osmosis.	VáGy	23-24	ML	ZF
	27, Oct (MED.DENT) 18:30-19:15			SzöÁ			
	23, Oct (Med, Dent)	16	The structure of biological membranes. Membrane transport.	VáGy	25-26	BZs	ML
	27, Oct (MED.DENT) 19:15-20:00			SzöÁ			
9	30, Oct (Med, Dent)	17	Thermodynamic equilibrium potentials (Nernst, Donnan). Diffusion potential, Goldman-Hodgkin-Katz equation.	VZ	25-26	BZs	ML
	30, Oct (Med, Dent)			VZ			
10	6, Nov (Med, Dent)	19	Resting potential, action potential, and electrical excitability. Measurement of membrane potential.	PGy	for MB_E: 11-18	MB_E: FZs	PF
	6, Nov (Med, Dent)			PGy			
	6, Nov (Med, Dent)	20	The physical background of ECG and EEG.	PGy	for MB_E: 11-18	MB_E: FZs	PF
	6, Nov (Med, Dent)			PGy			
2nd SCT Lectures 1-18, approx. 90% of the questions will focus on topics not included in the 1st SCT, Week11, 13 November							
11	13, Nov (Med, Dent)	21	The human ear. Mechanism of hearing. The Weber-Fechner law.	NP	19-20	VZ	PGy
	13, Nov (Med, Dent)			SzG			
	20, Nov (Med, Dent)	23	Fluid mechanics, blood circulation.	ZF	21-22	SzG	PGy
	20, Nov (Med, Dent)			ML			
12	20, Nov (Med, Dent)	24	Flow cytometry. Confocal laser scanning microscopy.	ML	23-24	ML	ZF
	20, Nov (Med, Dent)			SzG			
13	27, Nov (Med)	25	Biophysics of respiration. (not compulsory for dentistry students)	SzöÁ	23-24	ML	ZF
	27, Nov (Med)			BZs			
14	4, Dec (Med)	27	Modern microscopic techniques (atomic force microscopy, super resolution microscopy). (not compulsory for dentistry students)	ML	25-26	BZs	ML
	4, Dec (Med)			PGy			
	4, Dec (Med)	28	Research in the Institute. (not compulsory for dentistry students)	PGy	for MB_E: 19-27	MB_E: FZs	ML
	4, Dec (Med)			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)