

Program of Study : GENERAL MEDICINE
Course : MEDICAL BIOPHYSICS, BIOMETRICS
 AND COMPUTER TECHNOLOGY
Abbreviation : LBF/VAB11
Schedule : 30 hours of lectures
 30 hours of tutorials
Course Distribution : first year, summer semester
Number of Credits : 10
Course Form : lectures, laboratory practical classes

Lectures: Fridays 8:30 – 10:00 RLH

Teachers: MUDr. Mgr. Robert Bajgar, Ph.D.

Mgr. Kateřina Langová, Ph.D.

Mgr. Svatopluk Binder, Ph.D.

Lectures:

	Date	Subject	Hrs.	Teacher
1	17.2.	Introduction to biostatistics.	2	LANGOVÁ
2	24.2.	Sampling and descriptive statistics.	2	LANGOVÁ
3	3.3.	Hypothesis testing, parametric tests.	2	LANGOVÁ
4	10.3.	Non-parametric tests, categorical data analysis, dependency measurement.	2	LANGOVÁ
5	17.3.	Cell biophysics I. Active and passive transport of molecules. Filtration. Diffusion. Osmosis.	2	BINDER
6	24.3.	Biophysics of respiration.	2	BAJGAR
7	31.3.	Biophysics of electric manifestations in organism, and their use in therapy I	2	BAJGAR
8	7.4.	Biophysics of electric manifestations in organism, and their use in therapy II	2	BAJGAR
9	14.4.	Cell biophysics II. Membrane potential. Oxidative phosphorylation. Cell signaling.	2	BINDER
10	21.4.	Magnetic resonance.	2	BAJGAR
11	28.4.	Ionizing radiation in medicine. Imaging methods using ionizing radiation. Radiation illness.	2	BAJGAR
12	5.5.	Experimental methods of biophysics.	2	BAJGAR
13	12.5.	Nanotechnology in medicine.	2	BAJGAR
14	29.5.	Selected methods of nuclear medicine.	2	BAJGAR
15	26.5.	Biophysical calculations II.	2	BAJGAR

Laboratory practical classes:

Teachers: Mgr. Svatopluk Binder, Ph.D.
MUDr. Martin Sněhota
Mgr. Kateřina Langová, Ph.D. (PC)
Mgr. Jana Zapletalová, Dr. (PC)

Practical classes – by cyclic exchange in working groups

	Week	Subject	Hrs.
1-12	13.2.-17.2.	16. <u>Work with Computer</u> : Principles of database formation, data organization, sorting, functions, calculations and sums in Excel.	2
	20.2.-24.2.	17. <u>Work with Computer</u> : Statistic data description. Contingency table formation. Graphic data presentation.	
	27.2.- 3.3.	18. <u>Work with Computer</u> : Data analysis, chi-square test for contingency tables.	
	6.3.- 10.3.	19. <u>Work with Computer</u> : Parametric tests, correlation and regression analysis.	
	13.3.-17.3.	20. Basic methods of spirometry.	
	20.3.-24.3.	21. Stress electrocardiography.	
	27.3.-31.3.	22. Ultrasound imaging.	
	3.4.-7.4.	23. CT imaging	
	10.4.-14.4.	24. MR imaging.	
	17.4.-21.4.	25. Measuring of Radioactivity.	
	24.4.-28.4.	26. Hearing examination II.	
	1.5.- 5.5.	27. Computer aided perimetry.	
13	8.5.-12.5	High-tech medical equipments in laboratory – demonstration. Protocols presentation, grant of course unit credits – 1 st term.	
14	15.5.-19.5.	High-tech medical equipments in laboratory – demonstration. Protocols presentation, grant of course unit credits – 2 nd term.	2
15	22.5.-26.5.	Protocols presentation, grant of course unit credits – 3 rd term (the last term).	2

Completed by : Practicavit (Course Unit Credit), Practical exam (at least grade E, final grade weight 25 %) and theoretical exam (written test, at least grade E, final grade weight 75 %)

Requirements : 100% attendance at practical classes, measurement reports

Recommended literature:

Moodle /portal.upol.cz/ - study materials for lectures and practical exercises.

Ronto, G., Tarján, I.: An Introduction to Biophysics with Medical Orientation, Akadémia Kiadó, Budapest, 1999.

Herman, I.P.: Physics of the Human Body, Springer, 3rd edition, 2016.

Hrazdira, I., Mornstein, V.: Fundamentals of biophysics and medical technology, Brno, 2007.

Hobbie, R.K.: Intermediate Physics for Medicine and Biology, Springer, New York, 4th edition, 2007.

Paul Davidovits: Physics in Biology and Medicine, London UK, 2018.

Andrew W Wood: Physiology, Biophysics, and Biomedical Engineering, Boca Raton, USA, 2012.

Grosman, Z.: Lectures on Medical Biophysics, Olomouc, 1994.

Prof. RNDr. Hana Kolářová, CSc.
Head of Department