

Program of Study : GENERAL MEDICINE
Course : MEDICAL BIOPHYSICS, BIOMETRICS
 AND COMPUTER TECHNOLOGY
Abbreviation : LBF/VAA11
Schedule : 30 hours of lectures
 30 hours of tutorials
Course Distribution : first year, winter semester
Number of Credits : 0
Course Form : lectures, laboratory practical classes

Lectures: Thursdays 12:45 – 14:15, RLH

Teachers: MUDr. Mgr. Robert Bajgar, Ph.D.
 Ing. Ladislav Doležal, CSc.
 Dr.Christian Kollmann

Mgr. Svatopluk Binder, Ph.D.
 Mgr. Jaromír Vachutka, Ph.D.

	Date	Subject	Hrs.	Teacher
1	22.9.	Introduction to medical biophysics. Fundamentals of measurement.	2	BAJGAR
2	29.9.	Intermolecular forces. Biophysical properties of liquids and gasses. Molecular structure of living systems.	2	BINDER
3	6.10.	Physics of ultrasound.	2	DOLEŽAL
4	13.10.	Biophysics of blood circulation.	2	BAJGAR
5	20.10.	Sound and its properties. Human voice. Biophysics of hearing.	2	BAJGAR
6	27.10.	Therapeutic ultrasound application in medicine.	2	KOLLMANN (VACHUTKA)
7	3.11.	Biophysics of the optical analyzer. Optical system of the human eye, refractive disorders and their correction.	2	BINDER
8	10.11.	Electrocardiography.	2	BAJGAR
9	17.11.	Electromagnetic spectrum. Introduction to atomic and nuclear physics. Radioactivity. Interaction of ionizing radiation with matter.	2	BINDER
10	24.11.	Essentials of biomechanics.	2	BINDER
11	1.12.	Fluid balance and electrolyte distribution in human body.	2	BAJGAR
12	8.12.	Biosignals – generation, processing, analysis. Biophysics of sensory perception.	2	BAJGAR
13	15.12.	Biophysical calculations I.	2	BAJGAR
14	22.12.	Essentials of informatics, medical informatics. Computer hardware and software.	2	BAJGAR
15	5.1.	Lasers and optical instruments in medicine.	2	BINDER

Laboratory practical classes:

Teachers: MUDr. Mgr. Robert Bajgar, Ph.D.
Mgr. Svatopluk Binder, Ph.D.
MUDr. Martin Sněhota

Practical classes – by cyclic exchange in working groups

	Week	Subject	Hrs.
1	19.9.-23.9.	Introduction lesson - basic instructions, laboratory work rules, safety instructions	2
2-13	26.9.- 30.9. 3.10.- 7.10. 10.10.- 14.10. 17.10.- 21.10. 24.10.- 28.10. 31.10.- 4.11. 7.11.- 11.11. 14.11 - 18.11. 21.11.- 25.11. 28.11.- 2.12. 5.12. - 9.12. 12.12. - 16.12.	1. <u>Work with Computer</u> : Data analysis, protocol processing. 2. <u>Work with Computer</u> : Internet - Electronic information resources, electronic mail, antivirus protection principles. 3. <u>Work with Computer</u> : Essentials of image analysis (Olympus Micro Image). 4. <u>Work with Computer</u> : Application software (PC Doctor, Medmont – Computer aided perimetry). 5. Temperature measurement. 6. Biophysics of blood circulation. 7. Electrocardiography and Holter monitoring systems. 8. Basics of ultrasound imaging. 9. Doppler ultrasound methods. 10. Ultrasound bone densitometry. 11. Hearing examination I - basic audiometric examinations. 12. Basic methods in physiological optics.	2
14	19.12.-23.12.	Demonstration of instrumental technique. Tutorials substitution. Protocols presentation and grant of course unit credits – 1 st term.	2
15	2.1.-6.1.	Demonstration of instrumental technique. Tutorials substitution. Protocols presentation and grant of course unit credits – 2 nd term.	2
	13.2.-17.2.	Protocols presentation and grant of course unit credits- 3 rd term (the last term).	

Completed by: **Practicavit (Course Unit Credit)**

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