

**Semmelweis University, Faculty of Medicine - single, long-cycle medical training****Name of the host institution (and any contributing institution):**Biofizikai és Sugárbiológiai Intézet

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**Name of subject:** Orvosi biofizika II.**in English:** Medical Biophysics II**in German:** Medizinische Biophysik II.

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**Credit value:** 3**Semester:** 2. szemeszter

(in which the subject is taught according to the curriculum)

Hours per week	Lecture	Practical lesson	Seminar
3.5	1.0	2.5	0.0

Hours per semester	Lecture	Practical lesson	Seminar
0.0	0.0	0.0	0.0

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**Type of course:**obligatory

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**Academic year:**2025/26

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**Language of instruction (for optional and elective subjects):**

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**Course code:**

AOKFIZ1090\_2A

(in the case of a new course, to be completed by the Dean's Office, following approval)

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**Course coordinator name:** Dr. Kellermayer Miklós (Intézet igazgató)**Course coordinator location of work, telephone availability:** SE Biofizikai és Sugárbiológiai Intézet, 06-1-4591500/60200**Course coordinator position:** egyetemi tanár, igazgató**Course coordinator Date and number of habilitation:** 2004 PTE ÁOK 7/2004/habil

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**Objective of instruction and its place in the curriculum:**Aim is to give the knowledge and way of thinking necessary for exact and quantitative understanding of working mechanism of biological systems and the human organism.

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**Method of instruction (lecture, group work, practical lesson, etc.):**

lectures + practical lessons

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**Competencies acquired through completion of course:**

Understanding the physical background of life processes and the environmental factors influencing the organism (radiations). Doing and evaluation of measurements individually, production of laboratory reports.

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**Course outcome (names and codes of related subjects):**

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**Prerequisites for course registration and completion: (CODE):**

Medical Biophysics I

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**In the case of multi-semester courses, position on the possibility of and conditions for concurrent registration:**

We do not give permission for any reasons, only if the exam is passed in medical biophysics I.

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**The number of students required to start the course (minimum, maximum), student selection method:**

Maximum: the number of students in the 1st year.

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**Detailed course syllabus (if the course can be divided into modules, please indicate): (Theoretical and practical instruction must be broken down into hours (weeks), numbered separately; names of instructors and lecturers must be listed, indicating guest lecturers/instructors. It cannot be attached separately! For guest lecturers, attachment of CV is required in all cases!)**

*Lectures*

1. Generation and properties of X-ray (Dr. Kellermayer)
2. Fundamentals of X-ray diagnostics (Dr. Kellermayer)
3. Thermodynamics: equilibrium, change, laws (Dr. Zrínyi)
4. Transport processes I: Diffusion, Brownian motion. Osmosis (Dr. Veres)
5. Transport processes II: Flow of fluids and gases. Blood as fluid (Dr. Kellermayer)
6. Bioelectric phenomena (Dr. Csík)
7. Sound, ultrasound (Dr. Kellermayer)
8. Biophysics of sensory organs. Vision, hearing. (Dr. Kellermayer)

9. Building blocks of life: water, macromolecules, supramolecular systems (Dr. Kellermayer)
10. Biological motion. Biomechanics, molecular and tissue mechanics (Dr. Mártonfalvi)
11. Methods of investigating biomolecular structure and dynamics. X-ray diffraction, mass spectrometry, infrared spectroscopy (Dr. Kellermayer)
12. Methods of investigating biomolecular structure and dynamics. Radiospectroscopic methods, fundamentals of MRI. (Dr. Kellermayer)
13. Blood circulation and cardiac function (Dr. Kellermayer)
14. Biophysics of pulmonary function. Physical examination (Dr. Kellermayer)

### Practices

1	Blood pressure measurement, dataprocessing. _	
2	Coulter counter	
3	X-ray measurement	
4	Microscopy II.	
5	Gamma energy	
6	Electrocardiography	
7	Pulse generator	
8	Sensory function	
9	Isotope diagnostics	
10	Diffusion	
11	Audiometry	
12	Fluid flow	
13	CAT scan	

### 14. Repetition

Teachers: Dr. Gergely Agócs, Dr. Erika Balog, Dr. Tamás Bozó, Dr. Bálint Budavári, Csilla Csányi, Dr. György Ferenczy, Dr. Rita Galántai, Dr. Judit Gál-Somkuti, Dr. Dóra Haluszka, Dr. Levente Herényi, Dr. Angéla Jedlovszky-Hajdú, Ákos György Juhász, Dr. Dávid Juriga, Dr. Miklós Kellermayer, Dr. Katalin Kis-Petik, Dr. Nikoletta Kósa, Dr. Károly Liliom, Dr. Zsolt Mártonfalvi, Dr. Kristóf Molnár, Dr. Rita Padányi, Dr. Gusztáv Schay, Dr. György Török, Dr. Dániel Veres, Dr. István Voszka

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**Other courses with overlapping topics (obligatory, optional, or elective courses) in interdisciplinary areas. To minimize overlaps, topics should be coordinated. Code(s) of courses (to be provided):**

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**Requirements for attendance, options for making up missed sessions, and method of absence justification:**

Participation in the practical lessons is compulsory. No more than three absences from practices are allowed for any reason, otherwise the semester will not be credited. **The missed measurements should be done with another group during the 4 weeks cycle of laboratory practices if possible. (One should ask for the agreement of the teacher of own group and the other group.)**

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**Assessment methods during semester (number, topics, and dates of midterms and reports, method of inclusion in the course grade, opportunities for make-up and improvement of marks):**  
**(number, topics, and dates of midterms and reports, method of inclusion in the course grade, opportunities for make-up and improvement of marks)**

It will be announced on the homepage of the department during the first week of the semester.

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**Number and type of individual assignments to be completed, submission deadlines:**

Lab. report should be made about each measurement, that should be uploaded to "bifilab" server until the end of practice.

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**Requirements for the successful completion of the course:**

1. Participation on at least 75 % of the practices, (in case of more than 3 absences the signature for the semester is denied.)
2. Acceptance of the lab. reports. If one has more than 3 „not accepted" lab. reports, the signature is denied. The lab reports must be uploaded to the website at the end of the practice.

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**Type of assessment:**  
szigorlat\_en

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**Examination requirements (list of examination topics, subject areas of tests, lists of mandatory parameters, figures, concepts and calculations, practical skills, optional topics for the project assignment recognized as an exam and the criteria for its completion and evaluation)**

It will be announced on the homepage of the department and in the moodle during the first week of the semester.

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**Method and type of grading (Share of theoretical and practical examinations in the overall**

**evaluation. Inclusion of the results in the end-of-term assessment. Possibilities of and conditions for offered grades.): (Share of theoretical and practical examinations in the overall evaluation, Inclusion of the results in the end-of-term assessment, Possibilities of and conditions for offered grades)**

The final grade is the average of the grades for each questions

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**Printed resources:**

Required	Yes
Author	Damjanovich, Fidy, Szöllősi
Title	Medical biophysics
Publisher	Medicina
Year of publication	2009

Required	Yes
Author	Kellermayer et al.
Title	Medical biophysics practices
Publisher	Semmelweis
Year of publication	2015

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**Signature of habilitated instructor (course coordinator) announcing the course:**

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**Signature of the director of the host institution:**

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**Date of submission:**

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