

Biophysics lecture

Nursing and patient care, Health care and prevention basic course

Description of the course

Subject: Biophysics lecture

Year, semester: 1. grade - 1st semester

Hours:

full-time training: 1+0/week, correspondence training: 5+0/semester

1. week:

Lecture: Introduction, the subject of biophysics. Fundamental physics, atomic physics, electromagnetic waves.

2. week:

Lecture: Physics of the atomic nucleus, radioactivity, radiobiology, radiobiophysics

3. week:

Lecture: Effect of ionizing radiation on the living organism, basic dose units

4. week:

Lecture: Isotopes and their applications in medical practice

5. week:

Lecture: Physical imaging methods in medical diagnostics, X-ray diagnostics, CT

6. week:

Lecture: Gamma camera, SPECT, PET

7. week:

Lecture: Fundamentals of NMR

8. week:

Lecture: Properties and biomedical applications of ultrasound

9. week:

Lecture: The importance of diffusion in living organisms

10. week:

Lecture: Biophysics of metabolism and transport

11. week:

Lecture: Biophysics of respiration and circulation

12. week:

Lecture: Biophysics of cell membranes, membrane models

13. week:

Lecture: Bioelectric phenomena, electrocardiography

14. week:

Lecture: Biomechanics

Nursing and patient care, Health care and prevention basic course

Description of the course

Subject: Biophysics lecture

Year, semester: 1. grade - 1st semester

Hours:

full-time training: 1+0/week, correspondence training: 5+0/semester

Code: EKEE-102-00N_BASE EKEE-102-00N-EN

ECTS Credit: 2

Institute teaching the subject: Institute of Biophysics and Cell Biology, Department of Biophysics

Semester recommended for taking the subject: 1.

Prerequisite(s) for taking the subject: No prerequisites

Course supervisor: Prof. Dr. György Panyi

Education manager: Dr. Enikő Nizsalóczki (The date and location of the reception hours will be published in the first week of the semester on the institute's website.)

E-mail: biophysedu@med.unideb.hu

Objectives of the course:

Providing an adequate theoretical background for understanding the physical principles used in biology and medicine, and for learning about the physical processes taking place in living systems. An introduction to biophysical techniques used in biology and medicine to help:

- (i) understanding the pathomechanism of diseases,
- (ii) understanding and development of diagnostic and therapeutic procedures,
- (iii) understanding the functioning of cells, tissues, and organs at the molecular level

Brief description of the course:The course discusses the basics of traditional and contemporary medical-physical examination methods, the physical cornerstones of modern diagnostic imaging procedures and therapeutic applications. During the teaching of the subject, we provide insight into the molecular foundations of physics, biophysics and medical physics, so that our students are able to familiarize themselves with the modern molecular medicine of our time to the extent necessary for them. During the course, students learn about the physical basis of physiological processes and the physical operating principle of the modern instruments used.

Course structure:

Basic knowledge of natural sciences

Medical physics (e.g. physical basis of diagnostic and therapeutic procedures) Molecular biophysics (e.g. diffusion, membrane biophysics)

Biophysics of organs (e.g. vision, hearing, circulation)

Mandatory literature:

Lectures uploaded to the Institute's e-Learning interface, text descriptions ("booklets") of lectures

Recommended literature:

Sándor Damjanovich, Judit Fidy és János Szöllösi : Medical biophysics, Medicina, 2007.
ISBN 978 963 226 127 0

Educational website address: biophys.med.unideb.hu and the Moodle link provided there (e-Learning).

Type of exam:

Written exam, test-type.

Subject requirements:

1. **Lectures:** Attending the lectures is not mandatory, but is recommended, as the material presented at the lectures will be assessed in the exams, regardless of whether it is included in the book or not.

2. **Seminars:** None

3. **Exemptions:** Requests for exemption from the biophysics lecture course must be submitted to the Academic Department. The Institute of Biophysics and Cell Biology does not accept such requests.

4. **Conditions for signing the subject:** -

5. **Mid-term assessments:** Students do not write a test paper during the semester.

6. **Colloquium:** To pass the biophysics colloquium in the winter exam period following the course, the student has three exam options (A, B, C).

7. **Rules for computers and calculator use:**

Mobile phones are NOT allowed in the exams! From the use of mobile phones during lectures they must be kept switched off or muted.

In order to evaluate the tests fairly, to avoid possible distractions during the writing of the test and to protect the material of the tests, the use of the following types of calculators is NOT allowed:

(i) Calculators with built-in algebraic capabilities (e.g. capable of solving symbolic equations);

(ii) Computers, laptops, tablets, handheld computers; devices capable of storing text.

(iii) Calculators that have a typewriter-like (so-called QWERTY) keyboard or touch screen, or those that can be written on with a pen, are not permitted at this level. Calculators with letters on their keys (e.g. for entering hexadecimal numbers)

can be used if they are not arranged in QWERTY format.

(iv) Calculators or other devices that can communicate with each other.

(v) Calculators built into mobile phones.

(vi) Paper printing calculators.

In general, students may use any type of scientific or graphing calculator, as long as it is not one of the prohibited devices described above. However, the institute reserves the right to prohibit the use of all kinds of calculators and computers if the given test contains only simple calculations. Handing calculators to each other is not allowed, and the supervising teachers do not give students a calculator during the test.

8. Information about repeaters:-

Further information is primarily available on the website of the Institute of Biophysics and Cell Biology (biophys.med.unideb.hu) and on the institute's e-learning page. The current information for the given semester (topics, etc.) will be published on the institute's website in the first teaching week of the semester. Any other changes (e.g. rescheduling, etc.) will be published on the website or during the lectures, we will inform you of the students.