

**Teaching Program for the students of the Faculty of Medicine & Dentistry
5-year English Program at the Pomeranian Medical University in Szczecin
Course: Biophysics**

Name and address of Department:

Department of Medical Physics
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tel. 91 441-4520

Head of the Department:

Wojciech Podraza M.D.
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Person responsible for the didactics:

Wojciech Podraza M.D.
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Total hours:

45 total
15 seminars
30 practical classes

ECTS points: 7

Aim/s of the course: The aims of teaching biophysics are to present biophysical aspects of physiology as well as physical phenomena applications in medical equipments. The mainstream of students activity is based on the methods and theories applied in contemporary medicine.

Teaching Program:

Topics of seminars:

1. Light in medical investigation, diagnostics and therapy; Microscopy in medicine and biology; Lasers in medicine.

2. Electric signals from the body; Application of the bioimpedance measurements in medicine.
3. Radiation and radioactivity.
4. Physics of the ear and hearing.
5. Circulatory system - biophysical aspects.
6. Lungs and breathing - biophysical aspects.
7. Diagnostic and therapeutic application of ultrasound in medicine.
8. Magnetic resonance imaging (IMR) and NMR spectroscopy.

Topics of practical classes:

1. Measurements of absorption spectra of biological compounds in visible and ultraviolet range (apparatus UNICAM UV2, SPECOL, PHARO and SpectroSymulator software) - quality and quantity measurements of different solutions: real and virtual tests.
2. ECG practical exercises.
3. Image of an „artificial organ” obtained by model of the rectilinear scanner.
4. Determination of the linear and mass attenuation coefficient for different materials (X ray generators and WopSymulator software): real and virtual tests.
5. Bioelectrical impedance analysis for the indirect assessment of body composition in nutrition. Measuring impedance Z of a tissue as a function of frequency f .
6. Hearing thresholds determination by a pure tone audiometric hearing test.
7. Examination of the blood pressure in the rest and after the work.
8. Examination of the blood pressure with different width of cuffs.
9. Thermal and mechanical effect identification and measurement in the water treated by the ultrasound.
10. A-scan imagine in ultrasonography.
11. Determination of the blood flow using the calorimetric method.
12. Body's heat imaging (Thermovision camera V-20).
13. Observation of biological microobjects in bright-field light.
14. Evaluation of magnification of chosen optical microscopes.
15. Determining of size and shape of microobjects with the help of projection microscopy.
16. FEV (forced expiratory volume) examination of smoking and non-smoking students using peekflowmeter.
17. Examination of the surface tension of different types of fluids.
18. Spirometry – practical aspects.

Forms of activities: seminars, practical exercises and virtual exercises (Virtual Physics Laboratory)

Evaluation : Knowledge of the students is controlled by the tutor during the classes in the oral form. After finishing the practical exercises students have to prepare a written report and deliver one in two weeks.

The final exam is consisted of the 100 single-choice test questions.

Obligatory booklist:

- Cameron J., Skofronic J.G., Grant R.M.: *Physics of the Body*, Medical Physics Publishing 1992
- Tuliszka M.: *Biophysics, Laboratory Textbook*, Poznań 1997

Optional booklist:

- Davidovits P: *Physics in Biology and Medicine*, 2001
- Glaser R: *Biophysics*, Springer 2001

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Head of Department
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Rules and Regulations of Department of Medical Physics

1. The purpose of the exercises and seminars of biophysics is to present biophysical aspects of physiology as well as physical phenomenon applications in medical equipment. The mainstream of students activity is based on the methods and theories applied in contemporary medicine.
2. All activities are obligatory; knowledge of their content is necessary either for appropriate classes or for passing final examination. Knowledge of the students is controlled by the tutor during the classes in the oral form.
3. During the exercises student has to pay special attention on safety not switching on himself any equipment. Each exercise has to be done following the instruction. Any doubt everyone can consult the tutor.
4. Student's misbehaviour, non-cooperation or lack of basic knowledge may result in no seminar and/or laboratory credit.
5. After finishing the measurements students have to prepare a written report and deliver one in two weeks.
6. Each student is allowed to be absent once a semester.
7. Unjustified absence of 3 or more seminars and exercises needs the Dean's approval for further biophysics study.
8. To obtain credit student is required to attend the seminars & laboratories, and to deliver all study reports.
9. After successfully completing all works required during the semester, the student is allowed to enter the exam.
10. Passing the exam finishes the course of biophysics. The exam is consisted of the 100 single-choice test questions.

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