

Study Programme: Physics
Course Unit Title: Physics of the Human Body
Course Unit Code: F18FLO
Name of Lecturer(s): dr Olivera Klisurić
Type and Level of Studies: Bachelor Academic Degree
Course Status (compulsory/elective): elective
Semester (winter/summer): winter
Language of instruction: English
Mode of course unit delivery (face-to-face/distance learning): face-to-face
Number of ECTS Allocated: 6
Prerequisites:
<p>Course Aims:</p> <p>This module aims to introduce the laws of physics that are used to explain several bodily functions including the mechanics of muscles and body movements, fluid mechanics of blood and air flow, hearing and acoustic properties of the ears, vision optics, heat and energy and electrical signaling.</p>
<p>Learning Outcomes:</p> <p>The overall competence is acquiring knowledge and students' ability for individual and team scientific research work in the field of applying physical concepts to the human body. The specific competences are, for example:</p> <p><i>Knowledge and Understanding:</i></p> <ul style="list-style-type: none"> • describe the musculoskeletal and cardiovascular systems of the human body • apply the principles of physics to explain the biomechanics of the body • use physical quantities to explain the functioning of cardiovascular and pulmonary systems • analyse the electrical conduction system of the nerves, the brain and the heart • explain how physics influences the functions of the visual and auditory system • solve basic conceptual and numerical problems of human body related to energy, work, acceleration, forces, electricity, magnetism, sound, optics and modern physics <p><i>Skills:</i></p> <p>The intellectual skills associated with the assimilation of educational subject matter; preparation of notes, revision material, the ability to access and utilise information from a variety of sources</p>
<p>Syllabus:</p> <p><i>Theory</i></p> <p>The human body as a cybernetic system. The control systems in the human body. Biomechanics of skeletal system. Statics of the human body. Biomechanics of cardiovascular system: characteristics of blood flow through blood vessels. Thermodynamics of the human body: thermodynamic systems; the first and second laws of thermodynamics; energy changes in the body. Transport processes in the human body: transport of heat; diffusion, transport of substances through cell membranes. Electric processes in the human body: electric signals from the body and their registration; functional diagnostics. Bioacoustics: mechanical oscillations and waves; sound; human ear. Visible light, infrared and ultraviolet light in diagnosis and therapy. Physics of the eye and vision.</p>

Practice

Lab exercises on Biopac Student Lab System.

Required Reading:

Weekly Contact Hours:

Lectures:3

Practical work:2

Teaching Methods:

1. Irving P. Herman: Physics of the Human Body, Springer-Verlag Berlin Heidelberg, 2007.
2. John R. Cameron, James G. Skofronick, Roderick M. Grant: Physics of the Body, Medical Physics Publishing, Madison, 1999.
3. R. K. Hobbie: Intermediate Physics for Medicine and Biology, 3rd ed., Springer Sciences+Business Media, Inc., USA, 1997

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	Final exam	points
Active class participation		written exam	40
Practical work	10	oral exam	30
Preliminary exam(s)	20	
Seminar(s)			

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.