

Basics of Human Anatomy and Physiology (syllabus)

Instructor	Contact Information
Andrey SHUVAEV Ph.D. in Biophysics, Associate professor, Institute of Biology and Biotechnology Siberian Federal University, Krasnoyarsk	Svobodny, 79 Room 32-13 Tel +7 391 206 2165 Email: AShuvaev@sfu-kras.ru , andrey.n.shuvaev@gmail.com

Course description

«Basics of Human Anatomy and Physiology» is an extensive course, which provides the students with basic knowledge about of the human body. It is designed to prepare the student for the further courses of the master program «Medical and Biological Physics».

All topics can be divided in two major parts. The first one is for the structures of the systems and organs in the human body. The second one is for the physiology of these systems – the basic knowledge how does the organs functioning. A big part of the course is dedicated to the physics of this functioning.

Both examples of the course and the assessment problems are taken from the real clinical practice. The students will study how to prepare the records from the medical tests (biochemical, electronic and/or images) to the further analysis via classification or machine learning algorithms, which will be provided in the further courses.

Course aims

- To help students to systematize the knowledge about the human body and the processes in it.
- To assist students to prepare medical data for further analysis.
- To introduce the basic principles of physiology and physiology physics.
- To give an overview about the main test and observation procedures in medicine.

Course objectives

- To ensure that students are familiar with a basic methods of survey in medicine.
- To give students the holistic description of human anatomy and physiology.
- To give students an appreciation of the biochemical testing in medicine.

- To provide students with the basic routines of acquiring the electronic health records.
- To provide students with the techniques of medical data preparation and arrangement.

Learning outcomes

By the end of the course, the students will be able to:

- make the basic electronic health records (such as ECG and EEG),
- recognize the main organs and structures on the various medical images,
- analyze the basic biochemical test data,
- arrange the medical data for further analysis.

Outline of content

Week	Lectures	Practice session / Assignments	Hrs
1-2	Basic anatomical terms	<ul style="list-style-type: none"> • Terminology of Human Anatomy and Physiology • Planes, relations and movements in Anatomy • Imaging of anatomical structures • Home assignment No 1 	2 9
2-3	Bones and Skeleton Muscles	<ul style="list-style-type: none"> • Types and functions of bones • The structure and nomenclature of skeletal muscles • Myogram data collection • Home assignment No 2 	1 10
4-6	Cardiovascular (CVS) and Lymphatic Systems	<ul style="list-style-type: none"> • Components of CVS and Lymphatic System • Main arteries and Veins • Biochemical Data of Blood • Electrocardiogram recording • Home assignment No 3 	2 10
7-8	Nervous System	<ul style="list-style-type: none"> • Neuron, glia and synapse • Anatomy of Nervous System • Brain structure • Neural Pathways • EEG recording • Home assignment No 4 	2 10
9-10	Respiratory System	<ul style="list-style-type: none"> • Trachea, Bronchi and Lungs Structure • Diaphragm and Lungs Functioning • Spirogram Recording • Home assignment No5 	1 10
11-12	Digestive System	<ul style="list-style-type: none"> • Esophagus, Stomach and Intestine • Liver and Pancreas • The Stages of Digestion • Home assignment No 6 	2 10
13	Endocrine System	<ul style="list-style-type: none"> • Biochemistry of the Humoral Regulation • Home assignment No 7 	1 9

Week	Lectures	Practice session / Assignments	Hrs
14-15	Urinary and Reproductive Systems	<ul style="list-style-type: none"> • Kidneys, Ureters, Urinary Bladder and Uretra • The Excretion Process and Biochemical Data of the Urine • Male and Female Reproduction Biochemical Data • Home assignment No 8 	2 10
16		Final exam	2

Assessment and assessment method

The final exam is an individual problem in the form of a simulated experimental dataset. The student must demonstrate the abilities in:

- recognition of anatomical structures (30 points maximum),
- explaining the physiology of the given system (30 points maximum),
- analyzing the set of the given clinical biochemical test (40 point maximum).

Grade policy:

A (excellent work)	91-100 %
B (above average work)	81-90 %
C (average work)	71-80 %
D (below average work)	50-70 %
F (failed work)	<50 %

Recommended reading

1. Kim, E.E., Im, H.-J., Lee, D.S. and Kang, K.W. (2016) *Atlas and Anatomy of PET/MRI, PET/CT and SPECT/CT*. Springer International Publishing.
2. Olivetti, L. (Ed.) (2015) *Atlas of Imaging Anatomy*. Springer International Publishing.
3. Hwee, M.C. and Felicita, J. (2018) *Defining Physiology: Principles, Themes, Concepts*. Springer, Singapore.
4. Fogelman I., Gnanasegaran G., Wall H. (2012) *Radionuclide and Hybrid Bone Imaging*. Springer, Berlin, Heidelberg.
5. Borg P., Alvi A. R., Skipper N. and Johns C. (2014) *Radiological Anatomy for FRCR Part 1*. Springer, Berlin, Heidelberg.