# BASICS OF HUMAN ANATOMY AND PHYSIOLOGY

## Basic Information

**This is a course, which contributes to MSc award in Biology**

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| **Course period** | From September 1st till February 1st, 1 semester |
| **Study credits** | 2 ECTS credits |
| **Duration** | 72 hours |
| **Language of instruction** | English |
| **Academic requirements** | - BSc degree in Biology, Chemistry, Physics or Environmental Sciences or equivalent (transcript of records),<br>- Good command of English (certificate or other official document) |

## Course Description

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

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

The course has been designed to:

- ensure that students are familiar with basic methods of survey in medicine.

- give students the holistic description of human anatomy and physiology.

- give students an appreciation of the biochemical testing in medicine.

- provide students with the basic routines of acquiring the electronic health records.

- provide students with the techniques of medical data preparation and arrangement.

## Learning Outcomes of the Course

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.

## Course (module) Structure

| Learning Activities | Hours |
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| Lectures | 16 |
| Practice sessions / Seminars, | 16 |
| Self-study Assignments | 40 |
| Final Exam (including preparation) | - |

| | Total study hours | | 72 |
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## Course Outline

| Week | Lectures | Practical work / Assignments | Hours |
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| 1-2 | Basic anatomical terms | • Terminology of Human Anatomy and Physiology<br>• Planes, relations and movements in Anatomy<br>• Imaging of anatomical structures<br>  Home assignment No 1 | (2/2/2) |
| 2-3 | Bones and Skeleton Muscles | • Types and functions of bones<br>• The structure and nomenclature of skeletal muscles<br>• Myogram data collection<br>• Home assignment No 2 | (2/2/4) |
| 4-6 | Cardiovascular (CVS) and Lymphatic Systems | • Components of CVS and Lymphatic System<br>• Main arteries and Veins<br>• Biochemical Data of Blood<br>• Electrocardiogram recording<br>• Home assignment No 3 | (2/2/8) |
| 7-8 | Nervous System | • Neuron, glia and synapse<br>• Anatomy of Nervous System<br>• Brain structure<br>• Neural Pathways<br>• EEG recording<br>• Home assignment No 4 | (2/2/8) |
| 9-10 | Respiratory System | • Trachea, Bronchi and Lungs Structure<br>• Diaphragm and Lungs Functioning<br>• Spirogram Recording<br>• Home assignment No5 | (2/2/6) |
| 11-12 | Digestive System | • Esophagus, Stomach and Intestine<br>• Liver and Pancreas<br>• The Stages of Digestion<br>• Home assignment No 6 | (2/2/4) |
| 13 | Endocrine System | • Biochemistry of the Humoral Regulation | |

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| | | • Home assignment No 7 | (2/2/2) |
| 14-15 | Urinary and Reproductive Systems | • Kidneys, Ureters, Urinary Bladder and Uretra<br>• The Excretion Process and Biochemical Data of the Urine<br>• Male and Female Reproduction Biochemical Data<br>• Home assignment No 8 | (2/2/6) |
| 16 | Pass/Fail Exam | | |

# Course Instructors and Tutors, Contact Information

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

## Assessment

The final pass/fail 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:

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| 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 % |

## Core 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.