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Educational objectives (max. 6 items)  
 C1. To make student acquainted with issues of general physiology.  
 C2. To make student acquainted with issues of detailed physiology.  
 C3. Student should be able to discuss physiological processes in human body at the cell, organ and system level, and discuss relationship between functions of different systems.  
 C4. Student should be able to have integrative approach to the human body in case of a change in the functioning of a system.  
 C5. Student should be acquainted with numerical values of basic physiological variables.  
 C6. Student should learn basic functional tests to assess functions of human body.

Education result matrix for module/course in relation to verification methods of the intended education result and the type of class

Number of course education result	Number of major education result	Student who completes the module/course knows/is able to	Methods of verification of intended education results (forming and summarising)	Form of didactic class <i>**enter the abbreviation</i>
K 01	B1	describes water-electrolyte management in biologic systems;	written final exam written/oral test, presentation	L; MC
K 02	B2	describes acid-base balance and action of buffers in homeostasis of human body;	written final exam written/oral test, presentation	L; MC
K 03	B7	Knows the physicochemical and molecular basis of action of sensory organs;	written final exam written/oral test, presentation	L; MC
K 04	B18	knows digestive enzymes, mechanisms of chloride acid secretion in the stomach, role of bile, process of nutrients absorption and disorders associated with absorption	written final exam written/oral test, presentation	L; MC
K 05	B21	knows pathways of communication between cells; between cell an extracellular matrix and pathways of signals in the cell, and examples of their disorders, that lead to development of cancers and other disorders	written final exam written/oral test, presentation	L; MC
K 06	B24	describes: basis of excitability and conduction in the nervous system, superior functions of nervous system, physiology of smooth and skeletal muscle, blood functions ;	written final exam written/oral test, presentation	L; MC
K 07	B25	knows functions and regulatory mechanisms of organs and	written final exam written/oral test,	L; MC



		systems in human body including: circulation, respiratory system, alimentary system, urinary system and skin, and understands interactions between them	presentation	
K 08	B26	knows effects and control of secretion of hormones – physiological controlling mechanisms, clinical consequences of hormonal dysfunction;	written final exam written/oral test, presentation	L; MC
K 09	B27	knows functions and control of reproductive system in male and female	written final exam written/oral test, presentation	L; MC
K 10	B28	knows mechanisms of human ageing	written final exam written/oral test, presentation	L; MC
K 11	B29	knows basic quantitative parameters that describe functions of particular organs and systems including: limit of normal parameters and demographic factors affecting them	written final exam written/oral test, presentation	L; MC
S 01	B7	describes changes in functioning of human body when homeostasis is disturbed, evaluates particularly integrated response of human body to physical exercise, to exposure to low and high temperature, to sudden tilting, to sleep and awakening, to blood or water loss	written final exam written/oral test, presentation	L; MC
S 02	B8	is able to perform simple functional tests that evaluate human body as a system of stable regulation (exercise tests, loading test) and to interpret figures concerning basic physiologic variables;	written final exam written/oral test, presentation	L; MC

\*\* L - lecture; SE - seminar; AC – auditorium classes; MC – major classes (non-clinical); CC – clinical classes; LC – laboratory classes; SCM – specialist classes (magister studies); CSC – classes in simulated conditions; FLC – foreign language course; PCP practical classes with patient; PE – physical education (obligatory); VP – vocational practice; SS – self-study, EL – E-learning .

Please mark on scale 1-5 how the above effects place your classes in the following categories:

communication of knowledge, skills or forming attitudes:

Knowledge: 5

Skills: 5

Student's amount of work (balance of ECTS points)



Student's workload (class participation, activity, preparation, etc.)	Student Workload (h)
1. Contact hours:	150
2. Student's own work (self-study):	141
Total student's workload	291
ECTS points for module/course	12.5
Comments	
<b>Content of classes</b> (please enter topic words of specific classes divided into their didactic form and remember how it is translated to intended educational effects)	
<p><b>Lectures</b></p> <p><b>Winter semester (12 x 2 hours)</b></p> <ol style="list-style-type: none"> <li>1. Introduction to physiology. Homeostasis.</li> <li>2. Nervous system – introduction</li> <li>3. Nervous system – sensory system</li> <li>4. Nervous system - motor system</li> <li>5. Nervous system - senses</li> <li>6. Nervous system - brain</li> <li>7. Nervous system – autonomic nervous system</li> <li>8. Muscle physiology</li> <li>9. Hormones – hypothalamus, pituitary gland</li> <li>10. Hormones – growth control</li> <li>11. Reproduction and development</li> <li>12. Metabolism (insulin/glucagon). Body temperature regulation</li> </ol> <p><b>Summer semester (12 x 2 hours)</b></p> <ol style="list-style-type: none"> <li>1. Cardiovascular system – cardiac muscle</li> <li>2. Cardiovascular system – hemodynamic of circulation</li> <li>3. Cardiovascular system – regulatory mechanisms vascular system</li> <li>4. Cardiovascular system – blood flow in specific regions</li> <li>5. Respiratory system – mechanics of respiration</li> <li>6. Respiratory system – gas exchange, regulation of respiration</li> <li>7. Exercise</li> <li>8. Blood – red blood cells, hemostasis</li> <li>9. Immune system</li> <li>10. Physiology of kidneys</li> <li>11. Acid-base balance</li> <li>12. Physiology of digestive system</li> </ol>	
<p><b>Classes</b></p> <p><u>Winter semester</u></p> <p><b>Homeostasis. Membrane dynamics. Cell-to-cell communication. (5 hours)</b></p> <ul style="list-style-type: none"> <li>- definition of homeostasis, local and long-term mechanisms</li> <li>- internal environment of human body; water areas, ion composition</li> <li>- contribution of individual system in maintaining homeostasis</li> <li>- dynamics of biological membrane, membrane transport</li> </ul> <p><b>Nervous system: Excitability (5 hours)</b></p> <ul style="list-style-type: none"> <li>- Nervous system; function, organizing, pathways of signal conduction</li> <li>- Neuron: structure, types</li> <li>- resting and action membrane potential</li> <li>- conduction in neuron</li> </ul>	



- synapse: structure, types, conduction in the synapse
- Nervous system: sensory system. Senses. (6 hours)**
- properties of sensory systems
- Receptors: general properties and types of receptors
- somatic senses: touch, temperature, proprioception, pain
- Cerebral cortex – sensory, motor and associated areas
- Special senses: vision, hearing, smell, taste
- Nervous system: motor control system (6 hours)**
- Spinal cord: organization, properties of conduction, spinal reflexes
- muscle spindle
- Pyramidal and extrapyramidal system – functions
- Cerebellum: functional arrangement, role
- Equilibrium
- Nervous system: functions of the brain (6 hours)**
- Function of cerebral cortex: sleep/awakeness, language
- limbic system: emotions, memory, learning
- circadian rhythms
- Autonomic nervous system (ANS) (5 hours)**
- Division of the ANS,
- Neurotransmitters and receptors
- Effectors, neuromodulators
- Control of ANS by CNS
- Autonomic reflexes
- The ways of evaluation of ANS activity
- Muscle physiology (5 hours)**
- Skeletal muscles: structure of sarcomere, neuromuscular junction, types of skeletal muscles, excitation-contraction coupling, types of skeletal muscle contraction, sources of energy in muscle, factors affecting the strength of contraction, mechanics of contraction
- Smooth muscles: structure, bioelectric activity, types of smooth muscles, mechanics of contraction and relaxation, types of contractions
- Hormones (7 hours)**
- Hypothalamic and pituitary gland hormones, thyroid gland hormones, parathyroid gland, adrenal gland hormones
- Sex hormones
- Metabolism. Body temperature regulation (6 hours)**
- Metabolism: definition, variety, determinants, control, methods of measurement
- Endocrine function of the pancreas: insulin, glucagon
- Mechanisms of body Temperature regulation
- Summer semester**
- Physiology of cardiovascular system – cardiac muscle (5 hours)**
- Physiological properties of cardiac muscle, regulation of heart activity
- Basics of ECG
- Cardiac cycle
- Physiology of cardiovascular system - vascular system (6 hours)**
- functional differentiation cardiovascular system
- Hemodynamic principles
- Blood pressure, heart rate, venous pressure
- Physiology of cardiovascular system – regulation. Venous blood flow. Capillary blood flow. (6 hours)**
- Regulation of circulation: local, nervous, reflex, hormonal
- Venous circulation
- Capillary circulation
- Physiology of cardiovascular system – blood flow in specific regions. Exercise. (6 hours)**



- Properties of circulation and control mechanisms in specific regions: coronary circulation, cerebral circulation, pulmonary circulation, blood flow in the skin, visceral circulation, blood flow in the skeletal muscles.

- Exercise; ventilatory and cardiovascular responses to exercise, metabolism and exercise, temperature regulation during exercise. Exercise tests.

**Respiratory system (6 hours)**

- Mechanics of respiration: ventilation, respiratory resistance, function of respiratory pathways

- Spirometry

- Exchange of gases in the lungs, , gasometry

- Nervous and chemical control of respiration

**Blood: Erythrocytes (RBCs) (5 hours)**

- Composition and functions of blood; erythropoiesis

- Properties and functions of erythrocytes

- Hemoglobin: structure and properties

- Gas transport in the blood

**Blood: Leucocytes (WBCs). Hemostasis and coagulations (5 hours)**

- Leucocytes: types, functions

- Immunity: types, mechanisms

- Hemostasis: phases of coagulation and fibrinolysis

- Role of platelets and the wall of blood vessel in clot formation

**Fluid-electrolyte balance. Physiology of the kidney (6 hours)**

- Kidney's anatomy

- Filtration, reabsorption and secretion in the kidneys

- Role of the kidneys in acid-base balance

- Endocrine activity of the kidneys

- Hormones that affect kidney's function

**Digestive system. The liver (6 hours)**

- Control of food intake

- Function and regulation of motility and secretion in the digestive system

- Digestion and absorption of nutrients

- Function of the liver

**Other**

**Basic literature (list according to importance, no more than 3 items)**

1. Silverthorn. Human Physiology. Integrated Approach.

**Additional literature and other materials (no more than 3 items)**

1. Guyton. Textbook of Medical Physiology

2. William F. Ganong Review of Medical Physiology 22e

**Didactic resources requirements (e.g. laboratory, multimedia projector, other...)**

Computer lab, multimedia projector, TV with DVD player, daylight projector, blackboard, whiteboard, stationery, esthesiometer, TIP THERM device, neurological hammer, Piórkowski apparatus, ECG unit, apparatus for blood pressure measuring, device for hemodynamic measurements, spring dynamometer, infrared thermometer, weight evaluating fat content, measuring tape, stethoscope, spirometer, pickflowmeter, hematological lancets, hematocrit centrifuge, hematocrit tubes, serum with antibodies, light microscope, microscope slides, tissue/lignin, Petri dish, didactic films, hydrogen breath test gauge, glasses with stearin, hollowed slides, pulsoximeter, stopwatch, body composition weight, metronome,

**Preliminary conditions (minimum requirements to be met by the student before starting the module/course)**



Student has to know human anatomy, histology and the course of basic chemical reactions and biochemical processes taking place in the human body.

Conditions to receive credit for the course (specify the form, criteria and conditions of receiving credit for classes included in the module/course, admission terms to final theoretical or practical examination, its form and requirements to be met by the student to pass it and criteria for specific grades).

Each absence must be made up, including rector's days or dean's hours. Conditions to receive credit for the course (specify the form, criteria and conditions of receiving credit for classes included in the module/course, admission terms to final theoretical or practical examination, its form and requirements to be met by the student to pass it and criteria for specific grades).

Conditions required for getting credit for classes:

- attendance at all classes
- obtaining at least a satisfactory grade from each partial test
- obtaining at least a satisfactory grade from each semester, which is calculated from the average of all grades obtained in a given semester

Every absence from classes must be made up, including rector days and dean's hours (in this case, a form of presentation or essay prepared by the student as part of self-study is recommended).

Conditions required for admitting the student to the final exam:

- to take the final exam student has to obtain credit for each semester at least for a satisfactory grade.

Form of the final exam: oral or written test

In order to pass the final exam, student has to obtain at least a satisfactory grade in accordance with the criteria given below.

<b>Grade:</b>	<b>Criteria for course</b>
Very Good (5.0)	average grade in the semester 4.76 – 5.0
Good Plus (4.5)	average grade in the semester 4.26 – 4.75
Good (4.0)	average grade in the semester 3.76 – 4.25
Satisfactory Plus (3.5)	average grade in the semester 3.26 – 3.75
Satisfactory (3.0)	average grade in the semester 3.00 – 3.25

<b>Grade:</b>	<b>Criteria for exam (if applicable)</b>
Very Good (5.0)	94% - 100% of total points for final exam
Good Plus (4.5)	86% - 93% of total points for final exam
Good (4.0)	78% - 85% of total points for final exam
Satisfactory Plus (3.5)	70% - 77% of total points for final exam
Satisfactory (3.0)	61% - 69% of total points for final exam

<b>Name of unit teaching course:</b>	<b>Department of Physiology</b>
Address	ul. T. Chałubińskiego 10, 50-368 Wrocław
Phone	71 784 00 91; 71 784 14 22; 71 784 14 23 faks: 71 784 00 92
E-mail	e-mail: wl-9@umed.wroc.pl



<b>Person responsible for course:</b>	Head of Department of Physiology: prof. dr hab. Beata Ponikowska
Phone	71 784 14 22; 71 784 14 23
E-mail	beata.ponikowska@umed.wroc.pl

<i>List of persons conducting specific classes:</i>	<i>degree/scientific or professional title</i>	<i>Discipline</i>	<i>Performer profession</i>	<i>Form of classes</i>
Agnieszka Buldańczyk	dr n. med.	medicine	academic	lectures, classes
Bartłomiej Paleczny	dr of health sciences	health sciences	academic	lectures, classes
Rafał Seredyński	mgr	biology	academic	lectures, classes
Agnieszka Siennicka	dr of health sciences	health sciences	academic	lectures, classes
Robert Skalik	dr n. med.	medicine	academic, physician	lectures, classes
Małgorzata Wyciszkievicz	dr mgr inż.	biotechnology	academic	classes
Adrianna Nowicka	mgr	biotechnology	academic	classes

**Date of Syllabus development**

24. 06.2019.

**Syllabus developed by**

dr n. med. Agnieszka Buldańczyk

**Signature of Head of teaching unit**

Uniwersytet Medyczny we Wrocławiu  
KATEDRA I ZAKŁAD FIZJOLOGII  
prof. dr hab. Beata Ponikowska

prof. dr hab. Beata Ponikowska

**Signature of Faculty Dean**

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