





<b>TOTAL per year: 150</b>													
<b>Department of Physiology</b>	20			130									
<b>Educational objectives (max. 6 items)</b> <b>C1.</b> To make students acquainted with issues of general physiology. <b>C2.</b> To make students acquainted with issues of detailed physiology. <b>C3.</b> Discussing physiologic processes in human body reflecting to the cell, organs, systems. <b>C4.</b> Students should have the ability to notice any change in function of particular system and to consider functions of human body as the whole. <b>C5.</b> To make students acquainted with numerical value of physiologic parameters. <b>C6.</b> Description of basic functional tests to assess functions of human body.													
<b>Education result matrix for module/course in relation to verification methods of the intended education result and the type of class</b>													
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>					
<b>W01</b>	BW1	describes water-electrolyte management in biologic systems;			Test, presentation, oral response, report, colloquium, oral examination/ written examination			L; MC					
<b>W02</b>	BW2	describes acid-base balance and action of buffers in homeostasis of human body;			Test, presentation, oral response, report, colloquium, oral examination/ written examination			L; MC					
<b>W03</b>	BW7	Knows the physicochemical and molecular basis of action of sensory organs;			Test, presentation, oral response, report, colloquium, oral examination/ written examination			L; MC					
<b>W04</b>	BW18	knows digestive enzymes, mechanisms of chloride acid secretion in the stomach, role of bile, process of nutrients absorption and disorders associated with absorption			Test, presentation, oral response, report, colloquium, oral examination/ written examination			L; MC					
<b>W05</b>	BW21	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			Test, presentation, oral response, report, colloquium, oral examination/ written examination			L; MC					



<b>W06</b>	<b>BW24</b>	describes: basis of excitability and conduction in the nervous system, superior functions of nervous system, physiology of smooth and skeletal muscle, blood functions ;	Test, presentation, oral response, report, colloquium, oral examination/ written examination	<b>L; MC</b>
<b>W07</b>	<b>BW25</b>	knows functions and regulatory mechanisms of organs and systems in human body including: circulation, respiratory system, alimentary system, urinary system and skin, and understands interactions between them	Test, presentation, oral response, report, colloquium, oral examination/ written examination	<b>L; MC</b>
<b>W08</b>	<b>BW26</b>	knows effects and control of secretion of hormones – physiological controlling mechanisms, clinical consequences of hormonal dysfunction;	Test, presentation, oral response, report, colloquium, oral examination/ written examination	<b>L; MC</b>
<b>W09</b>	<b>BW27</b>	knows functions and control of reproductive system in male and female	Test, presentation, oral response, report, colloquium, oral examination/ written examination	<b>L; MC</b>
<b>W10</b>	<b>BW28</b>	knows mechanisms of human ageing	Test, presentation, oral response, report, colloquium, oral examination/ written examination	<b>L; MC</b>
<b>W11</b>	<b>BW29</b>	knows basic quantitative parameters that describe functions of particular organs and systems including: limit of normal parameters and demographic factors affecting them	Test, presentation, oral response, report, colloquium, oral examination/ written examination	<b>L; MC</b>
<b>U1</b>	<b>BU7</b>	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	Test, presentation, oral response, report, colloquium, oral examination/ written examination	<b>L; MC</b>
<b>U2</b>	<b>BU8</b>	is able to perform simple functional tests that evaluate	Test, presentation, oral response, report, colloquium, oral	<b>L; MC</b>



		human body as a system of stable regulation (exercise tests, loading test) and to interpret figures concerning basic physiologic variables;	examination/ written examination	
<p>** 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 .</p>				
<p>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....</p>				
<b>Student's amount of work (balance of ECTS points)</b>				
<b>Student's workload</b> (class participation, activity, preparation, etc.)			<b>Student Workload (h)</b>	
1. Contact hours:			150	
2. Student's own work (self-study):			161	
Total student's workload			311	
<b>ECTS points for module/course</b>			13,0	
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>  Winter semester (5 lectures x 2 teaching hours)  Introduction to physiology. Homeostasis.  Nervous system – sensory system, senses  Nervous system – motor system  Hormones  Physiology of human body development  Summer semester (5 lectures x 2 teaching hours)  Cardiovascular system – cardiac muscle  Cardiovascular system – vascular system  Respiratory system  The kidneys  Immunity</p>				
<b>Seminars</b>				
<p>Classes  Winter semester  The Course in physiology lasts 15 weeks (15 classes x 4 teaching hours) and includes 3 partial tests ( 3 x 4 teaching hours). In the last week of the semester (the 15th week) students retake missed and failed classes (4 teaching hours ). Curriculum and duration of the remainig classes is as follows:  <b>Homeostasis (4 teaching hours)</b>  - definition of homeostasis, local and long-term mechanisms  - internal environment of human body; water areas, ion composition  - contribution of individual system in maintaining homeostasis  - dynamics of biological membrane, membrane transport  <b>Nervous system: Excitability (4 teaching hours)</b></p>				



- Nervous system; function, organizing, pathways of signal conduction
- Neuron: structure, types
- resting and action membrane potential
- conduction in neuron
- synapse: structure, types, conduction in the synapse

**Nervous system: Senses (4 teaching hours)**

- 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 (4 teaching hours)**

- Spinal cord: organization, properties of conduction, spinal reflexes
- muscle spindle
- Pyramidal and extrapyramidal system – functions
- Cerebellum: functional arrangement, role
- Equilibrium

**Nervous system: Higher nervous activity (4 teaching hours)**

- Physiologic basis of EEG
- Sleep: phases, physiologic role of the sleep
- Memory, learning and reflexes (descriptions, phases and types)
- Behavior (role of hypothalamus, limbic system, stress)

**Autonomic nervous system (ANS) (4 teaching hours)**

- Division of the ANS,
- Neurotransmitters and receptors
- Effectors, neuromodulators
- Control of the CNS on ANS
- Autonomic reflexes
- The ways of evaluation of ANS activity

**Hormones (4 teaching hours)**

- Properties, types, mechanisms of hormones action
- Control of endocrine system, : nervous, hormonal, metabolic
- Hypothalamic and pituitary gland hormones, hypothalamic-pituitary axis
- Thyroid gland hormones

**Hormones (4 teaching hours)**

- Endocrine function of pancreas: insulin, glucagon
- Hormones of adrenal medulla: mineralocorticoids
- Hormones of adrenal cortex and adrenal medulla
- Hormonal regulation of calcium-phosphate metabolism: PTH, calcitonin, vitamin D3

**Physiology of development and reproductive physiology (4 teaching hours)**

- Sex determination
- Sex hormones
- Functions of gonads
- Development: puberty, menopause, andropause, aging
- Fertilization, implantation, placental hormones, fetal circulation, lactation – hormonal control

**Muscle physiology (4 teaching hours)**

- Skeletal muscles: structure of sarcomere, neuromuscular junction, excitation-contraction coupling, types of skeletal muscles
- Smooth muscles: structure, bioelectric activity, types of smooth muscles
- Types of contractions

**Metabolism. Body Temperature regulation (4 teaching hours)**

- Metabolism: definition, variety, determinants, control, methods of measurement
- Mechanisms of body Temperature regulation



Summer semester

Course in physiology lasts for 15 weeks (15 classes x 4,6 teaching hours) and includes 3 partial tests (3x4,6 teaching hours). In the last week of the semester (15th week) students retake missed and failed classes (4,6 teaching hours). Curriculum and duration of the remaining classes as follows:

**Physiology of cardiovascular system: Cardiac muscle (4,6 teaching hours)**

- Physiological properties of cardiac muscle, regulation of heart activity
- Basics of ECG
- Cardiac cycle

**Physiology of cardiovascular system: Vascular system 1 (4,6 teaching hours)**

- Cardiovascular functional differentiation,
- Hemodynamic principles
- Blood pressure, heart rate, venous pressure – control mechanisms

**Physiology of cardiovascular system: Vascular system 2 (4,6 teaching hours)**

- Regulation of circulation: local, nervous, reflex, hormonal
- Venous circulation
- Capillary circulation

**Physiology of cardiovascular system: Specific vascular regions (4,6 teaching hours)**

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

**Respiratory system (4,6 teaching hours)**

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

**Respiratory system (4,6 teaching hours)**

- Exchange of gases in the lungs, transport of gases in the blood, gasometry
- Nervous and chemical control of respiration

**Water-electrolyte management. Physiology of the kidney (4,6 teaching hours)**

- Kidney's anatomy
- Filtration, reabsorption and secretion in the kidneys
- Acid-base balance in the kidneys
- Endocrine activity of the kidneys
- Hormones that affect kidney's function
- Composition and physicochemical properties of the urine

**Blood. Erythrocytes (4,6 teaching hours)**

- Composition and functions of blood; Erythropoiesis
- Properties and functions of erythrocytes
- Hemoglobin: structure and properties

**Blood: Leucocytes. Hemostasis (4,6 teaching hours)**

- Leucocytes: types, functions
- Immunity: types, mechanisms
- Hemostasis: phases of clotting and fibrinolysis,
- Role of platelets and the wall of blood vessel in clot formation

**Gastrointestinal (GI) tract. The liver (4,6 teaching hours)**

- Control of food intake
- Function and regulation of motility and secretion in GI tract

**Compensative mechanisms in chosen conditions (4,6 teaching hours)**

- Impact of gravity, acceleration, increased barometric pressure
- Acclimatization
- Physical exercise

**Other**



- 1.
  - 2.
  - 3.
- etc. ...

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

1. Silverthorn. Human Physiology. Integrated Approach.
2. Guyton. Textbook of Medical Physiology
3. William F. Ganong Review of Medical Physiology 22e

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

1. Krótkie wykłady. Neurobiologia. A. Longstaff, Wydawnictwo Naukowe PWN, 2012;
2. Repetytorium z fizjologii hemostazy. B. Sokołowska, Acta Haematologica Polonica, 2010;
3. Atlas fizjologii człowieka Nettera, red. wyd. pol. Stanisław Konturek, Elsevier Urban & Partner, 2005

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

Virtual physiology laboratory, computer programs, multimedia projector, scripts, TV and DVD, microscopes, multimedia programs, glucometer, centrifuge, immune serum, sofa, spirometer, electrocardiographic unit, sphygmomanometer, stethoscope, track, hemodynamic monitor, cycle ergometer, analyser of respiratory gases, equipment for urine analysis, pulse oximeter, dynamometer, scale

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

Knowledge of anatomy and morphology of human organs and systems.  
Knowledge of basic physical and biochemical processes in human body.

**Conditions to receive credit for the course** (specify the form 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 for completing the individual classes: student has to receive pass mark for partial tests, presentations; and credit for classes in the range and number determined in Study Regulation of Physiology Department.

Rules of admission to the final examination: meeting conditions of current regulations of Department of Physiology

Requirements the student has to meet to be allowed to sit in the final exam: student has to receive credit for classes and lectures

Form of the exam: written examination covering classes and lectures. To pass the exam student must obtain at least satisfactory grade, according to the criteria listed below.

<b>Grade:</b>	<b>Criteria</b> (only for courses/modules ending with an examination)
Very Good (5.0)	94% - 100% for final examination
Good Plus (4.5)	86% - 93% for final examination
Good (4.0)	78% - 85% for final examination



Satisfactory Plus (3.5)	70% - 77% for final examination
Satisfactory (3.0)	61% - 69% for final examination

**Name and address of module/course teaching unit, contact: telephone and e-mail address**

Department of Physiology  
ul. T. Chałubińskiego 10, 50-368 Wrocław  
tel.: 71 784 00 91, 71 784 14 22, 71 784 14 23  
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**Coordinator / Person responsible for module/course, contact: telephone and e-mail address**

Head of the Department of Physiology  
prof. dr hab. Beata Ponikowska  
tel.: 71 784 14 22, 71 784 14 23  
e-mail: [beata.ponikowska@umed.wroc.pl](mailto:beata.ponikowska@umed.wroc.pl)

**List of persons conducting specific classes: full name, degree/scientific or professional title, discipline, performed profession, form of classes.**

Beata Ponikowska, prof.dr hab. n. med., wykłady, ćwiczenia  
Wojciech Barg, dr hab. n.med. (lekarz medycyny), wykłady, ćwiczenia  
Agnieszka Buldańczyk, dr n.med., (biolog), ćwiczenia, wykłady  
Anna Janocha, dr hab. n.med., (lekarz medycyny), wykłady, ćwiczenia  
Bartłomiej Paleczny, dr n.med., (biolog), ćwiczenia, wykłady  
Agnieszka Siennicka, dr n. o zdrowiu, (biolog, psycholog), ćwiczenia, wykłady  
Robert Skalik ,dr n.med., (lekarz medycyny), ćwiczenia, wykłady  
Anna Tumińska, dr n.med., (lekarz medycyny), ćwiczenia, wykłady

**Date of Syllabus development**

16.06.2017

**Syllabus developed by**

dr Agnieszka Buldańczyk

**Signature of Head of teaching unit**

Prof. dr hab. Beata Ponikowska

Uniwersytet Medyczny we Wrocławiu  
KATEDRA I ZAKŁAD FIZJOLOGII  
kierownik

Prof. dr hab. Beata Ponikowska

**Signature of Faculty Dean**

Wrocław Medical University  
FACULTY OF MEDICINE  
VICE-DEAN FOR STUDIES IN ENGLISH  
Prof. Andrzej Hendrich, PhD