



Syllabus for academic year: 2021/2022 Training cycle:2020/2021-2025/2026													
Description of the course													
Course	Physiology										Group of detailed education results		
	Group code	Group name											
	B	Scientific Basics of Medicine											
Faculty	Faculty of Medicine												
Major	medicine												
Level of studies	X uniform magister studies												
Form of studies	X full-time												
Year of studies	II					Semester:	X winter X summer						
Type of course	X obligatory												
Language of study	X English												
Number of hours													
Form of education													
	Lectures (L)	Seminars (SE)	Auditorium classes (AC)	Major Classes – not clinical (MC)	Clinical Classes (CC)	Laboratory Classes (LC)	Classes in Simulated Conditions (CSC)	Practical Classes with Patient (PCP)	Foreign language Course (FLC)	Physical Education (PE)	Vocational Practice (VP)	Directed Self-Study (DSS)	E-learning (EL)
Winter semester: 75													
Department of Physiology and Pathophysiology. Department of Physiology													
Direct (contact) education ¹				51									
Distance learning ²	24												
Summer semester: 75													
Department of Physiology and Pathophysiology. Department of Physiology													

¹ Education conducted with direct participation of university teachers or other academics

² Education with applied methods and techniques for distance learning



Direct (contact) education				51									
Distance learning	24												
TOTAL per year: 150													
Department of Physiology and Pathophysiology. Department of Physiology													
Direct (contact) education				102									
Distance learning	48												
Educational objectives (max. 6 items)													
C1. To familiarize the student with functioning of individual organs and systems of the human body and their influence on each other.													
C2. Understanding physiological principles and mechanisms that regulate physiological processes.													
C3. To familiarize the student with the correct numerical values of the basic physiological parameters.													
C4. To familiarize the student with the basic methods of measuring physiological functions.													
C5. To familiarize the student with selected functional tests that assess functioning of the human body.													
C6. Development social competences needed to practice the medical profession, in accordance with graduate's profile.													
Education result for course in relation to verification methods of the intended education result and the type of class:													
Number of detailed education result	Student who completes the course knows/is able to			Methods of verification of intended education results	Form of didactic class <i>*enter the abbreviation</i>								
B.W1	knows and understands the water-mineral balance of biological systems;			oral test, written test, oral exam, written exam	L; MC								
B.W2	knows and understands the acid-base balance and the mechanism of action of buffers and their importance in body homeostasis;			oral test, written test, oral exam, written exam	L; MC								
B.W5	knows and understands the physical laws describing fluid flow and factors affecting vascular resistance to blood flow;			oral test, written test, oral exam, written exam	L; MC								
B.W7	knows and understands the physicochemical and molecular basis of the functioning of the sensory organs;			oral test, written test, oral exam, written exam	L; MC								
B.W17	knows and understands the ways in which cells communicate with each other and with the extracellular matrix, and the pathways for transmitting signals within the cell, and examples of disruption of these processes leading to cancer and other diseases;			oral test, written test, oral exam, written exam	L; MC								



B.W20	knows and understands the basics of stimulation and conduction in the nervous system and higher nervous knows and understands functions, as well as striated and smooth muscle physiology and blood functions;	oral test, written test, oral exam, written exam	L; MC
B.W21	knows and understands the function and regulation mechanisms of all organs and systems of the human body, including the cardiovascular system, the respiratory system, the digestive system, the urinary system and the skin, as well as the relationships existing between them;	oral test, written test, oral exam, written exam	L; MC
B.W22	knows and understands the course and regulation of reproductive functions in men and women;	oral test, written test, oral exam, written exam	L; MC
B.W23	knows and understands the body's ageing mechanism;	oral test, written test, oral exam, written exam	L
B.W24	knows and understands the basic quantitative parameters describing the performance of various systems and organs, including the ranges of norms and demographic factors affecting the values of these parameters;	oral test, written test, oral exam, written exam	L; MC
B.W25	knows and understands the relationship between factors disturbing the equilibrium state of biological processes and physiological and pathophysiological changes;	oral test, written test, oral exam, written exam	L; MC
C.W21	knows and understands the basic development and mechanisms of action of the immune system, including specific and non-specific humoral and cellular immunity mechanisms;	oral test, written test, oral exam, written exam	L; MC
C.W49	knows and understands the enzymes involved in digestion, the mechanism of hydrochloric acid production in the stomach, the role of bile, the course of absorption of digestive products;	oral test, written test, oral exam, written exam	L; MC
C.W51	knows and understands the mechanism of action of hormones.	oral test, written test	L; MC
B.U7	is able to perform simple functional tests assessing the human body as a system of stable regulation (stress tests, exercise tests) and interpret numerical data on basic physiological variables;	execution of the recommended task	MC
C.U20	is able to describe the changes in bodily functions when homeostasis is disturbed, particularly the integrated response to exercise, exposure to high and low temperatures, loss of blood or water, sudden verticalisation, and the transition from sleep to wake-up.	execution of the recommended task	MC

* L- lecture; SE- seminar; AC- auditorium classes; MC- major classes (non-clinical); CC- clinical classes; LC- laboratory classes; CSC- classes in simulated conditions; PCP- practical classes with patient; FLC- foreign language course; PE- physical education; VP- vocational practice; DSS- directed self-study; EL- E-learning

Student's amount of work (balance of ECTS points):	
Student's workload (class participation, activity, preparation, etc.)	Student Workload
1. Number of hours of direct contact:	102
2. Number of hours of distance learning:	48
3. Number of hours of student's own work:	141
4. Number of hours of directed self-study	n/a
Total student's workload	291
ECTS points for course	13
Content of classes: (please enter topic words of specific classes divided into their didactic form and remember how it is translated to intended educational effects)	
<p>Lectures form: online</p> <p>Winter semester 12 weeks/ 2 hours</p> <ol style="list-style-type: none"> 1. Introduction to physiology. Homeostasis. 2. Nervous system – introduction 3. Nervous system – sensory system 4. Nervous system – senses 5. Nervous system - motor system 6. Nervous system – brain function 7. Nervous system – autonomic nervous system 8. Muscle physiology 9. Hormones – part 1 10. Hormones – part 2 11. Reproduction and development 12. Metabolism (insulin/glucagon). Body temperature regulation. <p>Summer semester 12 weeks/2 hours</p> <ol style="list-style-type: none"> 1. Cardiovascular system – cardiac muscle 2. Cardiovascular system – cardiovascular hemodynamics 3. Cardiovascular system – regulatory mechanisms 4. Cardiovascular system – blood flow in specific regions of the body 5. Respiratory system – ventilation 6. Respiratory system – gas exchange, regulation of respiration 7. Exercise 8. Blood – red blood cells, hemostasis 9. Immune system 10. Physiology of kidneys 11. Acid-base balance 12. Physiology of digestive system 	
Classes 12 weeks/4hours, 1 week/3 hours; form: direct contact	
<p><u>Winter semester</u></p> <p>Homeostasis. Membrane dynamics. Cell-to-cell communication. 5 hours</p> <ul style="list-style-type: none"> - 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 <p>Nervous system: Excitability. 5 hours</p> <ul style="list-style-type: none"> - Nervous system; function, structure, pathways of signal conduction - Neuron: structure, types, function - Resting membrane potential and action membrane potential - Conduction of a signal in a neuron 	

- Synapse: structure, types, conduction in the synapse

Nervous system: sensory system. Senses. 5 hours

- Properties of sensory systems
- Sensory receptors: general properties and types of receptors, transduction
- Somatic senses: touch, temperature, proprioception, pain
- Special senses: vision, hearing, smell, taste

Nervous system: motor control system. 5 hours

- Spinal cord: structure, properties of conduction, spinal reflexes
- Muscle spindle
- Piramidal and extrapyramidal system
- Cerebellum: functional arrangement, role of cerebellum
- Equilibrium

Nervous system: functions of the brain. 5 hours

- Function of cerebral cortex: sleep/awakeness, language
- Limbic system: emotions, memory, learning
- Circadian rhythms

Autonomic nervous system (ANS). 5 hours

- Division of the autonomic nervous system,
- Neurotransmitters and receptors
- Effectors, neuromodulators of ANS
- Control of ANS by CNS
- Autonomic reflexes
- 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 skeletal muscle, factors affecting the strength of contraction, mechanics of contraction
- Smooth muscles: structure, types of smooth muscles, mechanics of contraction and relaxation, types of contractions

Hormones. 5 hours

- Hypothalamic and pituitary gland hormones, thyroid gland hormones, parathyroid gland, adrenal gland hormones
- Sex hormones

Metabolism. Body temperature regulation. 5 hours

- Metabolism: definition, variety, determinants, control, methods of measurement
- Endocrine function of the pancreas: insulin, glucagon
- Mechanisms of body Temperature regulation

Clinical issues. 6 hours

Cystic fibrosis as an example of impaired membrane transport.

Selected demyelinating diseases as an example of nerve conduction disorders.

Menier's disease. Parkinson's disease. Epilepsy as an example of a disease caused by brain disorders.

Osteoporosis. Diabetes.

Summer semester

Physiology of cardiovascular system – cardiac muscle. 5 hours

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

Physiology of cardiovascular system - vascular system. 5 hours

- Functional differentiation of cardiovascular system
- Principles of cardiovascular hemodynamics
- Blood pressure, heart rate, venous pressure



Physiology of cardiovascular system – regulation. Venous blood flow. Capillary blood flow. 5 hours

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

Physiology of cardiovascular system – blood flow in specific regions. Exercise. 5 hours

- Properties of circulation and control mechanisms of blood flow 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. 5 hours

- Mechanics of respiration: ventilation in the lungs
- Spirometry
- Exchange of gases in the lungs. Gas transport.
- Nervous and chemical control of respiration

Blood: Erythrocytes (RBCs). 5 hours

- Composition and functions of blood; erythropoiesis
- Properties and functions of erythrocytes
- Hemoglobin: structure, types, properties and combinations of hemoglobin
- Gas transport in the blood

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

- Leucocytes: types, functions
- Immunity: types, mechanisms
- Hemostasis

Fluid-electrolyte balance. Physiology of the kidney. 5 hours

- Functional anatomy of the kidneys
- Glomerular filtration, reabsorption and secretion in the kidneys. Kidneys function test - measurement of renal clearance
- Micturition
- Water-electrolyte balance and acid-base balance of the body.
- Vasopressin. Aldosterone. RAS system.

Digestive system. The liver. 5 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

Clinical issues. 6 hours

Essential hypertension. Edema - types, mechanism of formation. High-altitude hypoxia.

Serological conflict. Gout. Gastroparesis..

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

1. Dee Unglaub Silverthorn, Human Physiology: An Integrated Approach. Pearson Education 2016

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

1. William F. Ganong Review of Medical Physiology 22e
2. Guyton and Hall, John E. Hall, Textbook of Medical Physiology

Preliminary conditions: (minimum requirements to be met by the student before starting the course)

Student knows human anatomy, histology, 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 and conditions of receiving credit for classes included in the 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)

Attention! Attendance can not be a condition for passing the course

Credit for the course takes place in direct contact with the teacher. In justified cases, by the Rector's decision, it may be remote.

Conditions required for getting credit for classes:

- getting credit for each class
- obtaining at least a satisfactory grade for each partial test
- obtaining at least a satisfactory grade for each semester, calculated from the average of all grades in the semester

Every absence from classes must be made up, including rector days and dean's hours.

Criteria for oral/written test

5.0 - the answer is fully adequate* to the content of the question/task; the answer is detailed**; the answer contains no substantive errors; the answer is consistent and contains no factual/terminological mistakes

4.5 - the answer is fully adequate* to the content of the question/task; the answer is detailed**; the answer contains no substantive errors; the answer is mostly consistent and/or contains minor factual/terminological mistakes

4.0 - the answer is mostly adequate* to the content of the question/task; the answer is detailed**; the answer contains a few substantive errors; the answer is mostly consistent and/or contains minor factual/terminological mistakes

3.5 - the answer is mostly adequate* to the content of the question/task; the answer is detailed**; the answer contains a few substantive errors

3.0 - the answer is mostly adequate* to the content of the question/task; the answer is general**; the answer contains a few substantive errors

2.0 - the answer is inadequate to the content of the question/task OR the answer contains numerous substantive errors.

* A fully adequate answer is focused on the content of the question/task (without unnecessary mentions of secondary aspects, and not exceeding the substantive scope of the question/task). A mostly adequate answer to some extent deviates from the content of the question/task (through unnecessary digressions, recalling content not related to the question/task, etc.) An inadequate answer is off-topic answer (mostly unrelated to the content of the question/task).

** A detailed answer thoroughly explains the majority of substantive aspects of the question/task. In a general answer, the majority of substantive aspects is discussed in a superficial, cursory manner (or they are omitted).

Final exam takes place in direct contact with the teacher. In justified cases, by the Rector's decision, it may be remote.

Conditions required for admitting the student to the final exam:

- in order to take the final exam, it is necessary to obtain a credit for each semester with at least a satisfactory grade.

Form of the final exam: exam in form of oral or written test

In order to pass the final exam, the student is obliged to obtain at least a satisfactory grade according to the criteria listed below:

Grade:	Criteria for courses ending with a grade ³
Very Good (5.0)	the average grade obtained in the semester is in the range of 4.76 - 5.00
Good Above (4.5)	the average grade obtained in the semester is in the range of 4.26 - 4.75
Good (4.0)	the average grade obtained in the semester is in the range of 3.76 - 4.25
Satisfactory Plus (3.5)	the average grade obtained in the semester is in the range of 3.26 - 3.75

³ The verification must cover all education results, which are realized in all form of classes within the course

Satisfactory (3.0)	the average grade obtained in the semester is in the range of 3.00 - 3.25
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Grade:	Criteria for oral/written exam ³
Very Good (5.0)	<ul style="list-style-type: none"> - the answer is fully adequate* to the content of the question/task - the answer is detailed** - the answer contains no substantive errors - the answer is consistent and contains no factual/terminological mistakes
Good Above (4.5)	<ul style="list-style-type: none"> - the answer is fully adequate* to the content of the question/task - the answer is detailed** - the answer contains no substantive errors - the answer is mostly consistent and/or contains minor factual/terminological mistakes
Good (4.0)	<ul style="list-style-type: none"> - the answer is mostly adequate* to the content of the question/task - the answer is detailed** - the answer contains a few substantive errors - the answer is mostly consistent and/or contains minor factual/terminological mistakes
Satisfactory Plus (3.5)	<ul style="list-style-type: none"> - the answer is mostly adequate* to the content of the question/task - the answer is detailed** - the answer contains a few substantive errors
Satisfactory (3.0)	<ul style="list-style-type: none"> - the answer is mostly adequate* to the content of the question/task - the answer is general** - the answer contains a few substantive errors

Department in charge of the course:	Department of Physiology and Pathophysiology. Department of Physiology
Department address:	50-368 Wrocław, ul. T. Chałubińskiego 10
Telephone:	71 784 00 91; 71 784 14 22; 71 784 14 23; faks: 71 784 00 92
E-Mail:	wl-42.1@umed.wroc.pl

Person in charge for the course:	prof. dr hab. Beata Ponikowska
Telephone:	71 784 14 22
E-Mail:	beata.ponikowska@umed.wroc.pl

List of persons conducting specific classes:

Name and surname	Degree/scientific or professional title	Discipline	Performed profession	Form of classes
Agnieszka Buldańczyk	dr n.med.		academic teacher	lectures; classes
Agnieszka Siennicka	dr n. o zdrowiu	medical science	academic teacher	lectures; classes
Bartłomiej Paleczny	dr hab.	medical science	academic teacher	lectures; classes
Rafał Seredyński	dr n. biol.	medical science	academic teacher	lectures; classes
Tymoteusz Okupnik	mgr biol.		academic teacher	classes




Date of Syllabus development

30.06.2021

Syllabus developed by

dr n. med. Agnieszka Buldańczyk

Dean's signature


Uniwersytet Medyczny we Wrocławiu
Katedra Fizjologii i Patofizjologii
Prodzian ds. kształcenia w Języku Angielskim
prof. dr hab. Beata Sobieszcańska

Signature of Head(s) of teaching unit(s)

prof. dr hab. Beata Ponikowska


Uniwersytet Medyczny we Wrocławiu
KATEDRA FIZJOLOGII I PATOFIZJOLOGII
kierownik

prof. dr hab. Beata Ponikowska