

SYLLABUS

Uniwersytet Medyczny w Lublinie
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The cycle of instruction 2019-2025

Module/course name:	HUMAN PHYSIOLOGY	Module code	LK.3.B.005
Faculty:	I Faculty of Medicine with Dentistry Division II Faculty of Medicine with English Language Division		
Major:	Medical		
Specialty:			
Level of study:	I (Bachelor studies) <input type="checkbox"/> II (Master studies) <input type="checkbox"/> integrated Master studies X III (Doctoral studies) <input type="checkbox"/>		
Mode of study :	full-time X part-time (extramural) <input type="checkbox"/>		
Year of study:	I <input checked="" type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> X <input type="checkbox"/> V <input type="checkbox"/> VI <input type="checkbox"/>	Semester :	1 X 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/>
Module/course type:	obligatory X elective <input type="checkbox"/>		
Language of instruction:	Polish <input type="checkbox"/> foreign X		
Form of education	Hours		
Lecture	40		
Seminar			
Laboratory class	95		
E-learning			
Practical class			
Internship			
Student's work input (participation in class, preparation, evaluation, etc.)	Student's hourly workload		
1. In class	135		
2. Student's own work	225		
Summary of the student's workload	360		
ECTS points for module/course	11		

Educational objectives: Physiology course will provide an in-depth introduction to basic concepts and fundamental principles of human physiology for medical students. The aim of the course is to provide knowledge on the function and control of normal organs as well as physiological integration of the organ systems to maintain homeostasis. Physiology bridges basic science and clinical practice with an emphasis on integrated mechanistic understanding of the function of cells, tissues, organ, and systems of human body. The course will follow the classical division between general physiology (molecular, cellular and tissue physiology) and systemic physiology (integrated tissue and organ system physiology). The physiology course includes: Cell Physiology; Physiology of Blood; Physiology of Muscles with elements of Sport Physiology; Physiology of Nervous System and Special Senses; Physiology of Cardiovascular System; Physiology of Respiratory System; Physiology of Kidney with Acid-Base Balance; Physiology of Digestive System; Metabolism; Physiology of Endocrine Glands; Physiology of Reproductive System; and Physiology of Aging.

The matrix of learning outcomes for module/ subject with reference to verification methods of the intended educational outcomes and forms of instruction:

Learning outcome code	A student who has obtained a credit for the module/course has the knowledge/skill to:	Methods of verifying the achievement of the intended learning outcomes:	Form of instruction * provide the symbol

B.W1.	describes water-electrolyte balance in biological systems;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
B.W2.	describes acid-base equilibrium and buffer action mechanism as well as their significance in systemic homeostasis;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
B.W3.	knows and understands the concepts of: solubility, osmotic pressure, isotonia, colloidal solutions and Gibbs-Donnan equilibrium;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
B.W5.	knows physical laws describing fluid flow and factors affecting blood flow vascular resistance;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W7.	knows physicochemical and molecular basis of sense organ activity;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W16.	knows the metabolic profiles of basic organs and systems;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
C.W47	knows the concepts of: system oxidation potential and oxidation stress;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
C.W49	knows enzymes taking part in digestion process, mechanism of hydrochloric acid production in the stomach, the role of bile, the course of digestive products absorption and disorders related to it;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
C.W50	knows the consequences of wrong nutrition, including long starvation, taking too big meals and having unbalanced diet;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC

C.W48	knows the consequences of vitamins or minerals deficiency and excess;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
	knows the methods of intercellular communication, communication between a cell and extracellular matrix and the signal transmission paths in a cell as well as examples of disturbances in these processes, leading to development of cancers and other diseases;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W20	knows basics of induction and transmission in the nervous system and higher nervous actions as well as physiology of striated and smooth muscles and blood functions;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W21	knows the action and control mechanisms of all organs and systems of the human body, including: circulatory, respiratory, digestive, urinary and integumentary systems and understands the nature of interrelations between them;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
C.W51	knows the hormone action mechanisms and the consequences of disturbances in hormonal control;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W22	knows the course and control of reproductive functions in males and females;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W23	knows the body aging mechanisms;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W24	knows the basic quantitative parameters describing efficiency of respective organs and systems , including the normal range and demographic factors affecting these parameters;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W26	knows the basic computer and biostatistical methods used in medicine, including medical data bases, spreadsheets, basic principles of computer graphics;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
B.W29	knows the principles of research work, observations and experiments and the <i>in vitro</i> studies in service of progress in medicine	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L

B.U1.	applies knowledge of the laws of physics to explain the effect of external factors, such as temperature, gravity, pressure, electromagnetic field and ionizing radiation on human body and its elements;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
B.U6	can predict the direction of biochemical processes depending on the cell energetic status;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L, LC
C.U20	describes changes in body functioning in states of homeostasis disturbances, and, in particular, specifies its integral response to physical strain, exposure to high and low temperature, loss of blood or water, sudden verticalization, transition from sleep to awake;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
B.U12	can explain differences between prospective and retrospective, randomized and clinical controlled trials, case description and experimental studies, and rank them in respect to credibility and quality of scientific evidence;	written exam - SSQ - MCQ - MRQ - matching test - true/false test	L
K01	follows the generally accepted ethical standards;	- an extended observation by a supervisor/tutor	L, LC
K02	has the ability to behave in accordance with the principles of health and safety at work.	- an extended observation by a supervisor/tutor	L, LC
K03	is able to cooperate with other students and creates work in a group	- an extended observation by a supervisor/tutor	L, LC

L- LECTURES; LC – LABORATORY CLASSES

Course content: (use keywords referring to the content of each class following the intended learning outcomes):

LECTURES:

Lecture 1 Electrophysiology, synapse.

Lecture 2 Somatic sensations, pain.

Lecture 3 Special senses.

Lecture 4 Muscle physiology.

Lecture 5 Motor functions.

Lecture 6 Introduction to endocrinology - chemical structure and synthesis of hormones.

Lecture 7 Pituitary hormones. The thyroid hormones. Adrenocortical hormones.

Lecture 8 Reproductive system.

Lecture 9 Glucose level hormonal regulation.

Lecture 10 Membrane physiology.

Lecture 11 Physiology of the digestive system.

Lecture 12 Blood physiology – hemostasis and blood coagulation.

Lecture 13 Blood physiology - white blood cells.

Lecture 14 Blood physiology - red blood cells.

Lecture 15 Physiology of the heart.

Lecture 16 Electrocardiogram. Acid - base balance.

Lecture 17 Physiology of circulation.

Lecture 18 The respiratory system physiology.

Lecture 19 Physiology of kidney.

Lecture 20 Acid-base balance.

LABORATORY CLASSES:

LAB 1

Introduction to physiology.

Introduction to the rules and regulations for studying physiology.

Functional organization of the human body and control of the "internal environment".

LAB 2

Neuron, synapse.

Neuron: the basic functional unit. Types of synapses. Function of the synapse. Synaptic transmitters. Neuropeptides, slowly acting transmitters or growth factors. Characteristics of synaptic transmission. Electrical events during neuronal excitation (EPSP) and neuronal inhibition (IPSP). Presynaptic inhibition. Spatial summation. Temporal summation. Facilitation of neurons. General classification of nerve fibers. Transmission of signals of different intensity in nerve tracts. Transmission and processing of signals in neuronal pools. Threshold and subthreshold stimuli - excitation or facilitation. Divergence of signals passing through neuronal pools. Convergence of signals. Neuronal circuit with both excitatory and inhibitory output signals. Prolongation of a signal by a neuronal pool- "afterdischarge". Inhibitory circuits as a mechanism for stabilizing nervous system function.

LAB 3

Somatic sensations.

Sensory receptors. Neuronal circuits for processing information. General organization, the tactile and position senses. Types of pain and their pathways of transmission. Thermal sensations.

Cutaneous sensation in human: touch, pressure, cold, warm – localization. Deep sensation. Discriminatory sensation: stereognosis, graphesthesia, extinction.

LAB 4

The special senses.

Optics of vision. Receptor and neural function of retina. Central neurophysiology of vision. Visual acuity, visual field.

Marriott's experiment, color vision – color test charts. The sense of hearing. Hearing sensations – air and bone conduction.

The chemical senses: taste and smell. The sense of taste – localization of taste senses on tongue.

LAB 5

Muscle physiology with elements of sport physiology.

General mechanism of muscle contraction. Molecular mechanism of muscle contraction. The neuromuscular junction. Muscle action potential. Excitation-contraction coupling. Energetics of muscle contraction. Isometric versus isotonic contraction. Fast versus slow muscle fibers. Mechanics of skeletal muscle contraction. Motor unit. Muscle contractions of different force-force summation. Frequency summation and tetanization. Sources of energy, work and fatigue of the skeletal muscle.

Muscle in exercises - strength, power, and endurance of muscles. Muscle metabolic systems in exercise. Oxygen debt. Nutrients used during muscle activity. Training.

Types of smooth muscles. The multi-unit smooth muscle. The unitary smooth muscle. Contraction of the smooth muscle. Contractile mechanism in the smooth muscle. Comparison of the smooth muscle contraction and the skeletal muscle contraction.

LAB 6

Reflex.

Organization of the spinal cord for motor functions.

Muscle sensory receptors - muscle spindles and Golgi tendon organs . Receptor function of the muscle spindle. Muscle stretch reflex. Role of the muscle spindle in voluntary motor activity. Clinical applications of the stretch reflex.

Golgi tendon reflex. Function of the muscle spindles and Golgi tendon organs in conjunction with motor control from higher levels of the brain. Flexor reflex and the withdrawal reflexes. Crossed extensor reflex. Reciprocal inhibition and reciprocal innervation. Reflexes of posture and locomotion. Postural and locomotive reflexes of the cord. Scratch reflex. Spinal cord reflexes that cause muscle spasm.

LAB 7

Motor functions. Clinical reflexes.

Motor cortex and corticospinal tract. Primary motor cortex. Premotor area. Supplementary motor area. Specialized areas of motor control found in the human motor cortex. Transmission of signals from the motor cortex to the muscles.

Incoming fiber pathways to the motor cortex. Red nucleus. Extrapyramidal system.

Excitation of the spinal cord motor control areas by the primary motor cortex and red nucleus.

The reticular and vestibular nuclei. Vestibular sensations and maintenance of equilibrium.

Functions of brain stem nuclei in controlling subconscious, stereotyped movements.

Cerebellum and its motor functions. Basal ganglia and their motor functions.

LAB 8

The higher nervous activity.

Functions of specific cortical areas. Association areas. "Wernicke's area" (a general interpretative area). Speech.

Functions of the parieto-occipitotemporal cortex in the nondominant hemisphere.

Higher intellectual functions of the prefrontal association areas.

Memory - roles of synaptic facilitation and synaptic inhibition. Short-term memory. Intermediate long-term memory. Long-term memory. Consolidation of memory.

Activating-driving systems of the brain. Limbic system. Hypothalamus. Reward" and "punishment" function of the limbic system. Functions of the hippocampus. Functions of the amygdala. Function of the limbic cortex.

States of brain activity. Sleep. Slow-wave sleep. REM sleep. Basic theories of sleep. Physiologic effects of sleep. Brain waves. Origin of brain waves.

LAB 9

Autonomic nervous system. Body temperature regulation.

Basic characteristics of sympathetic and parasympathetic function. Cholinergic and adrenergic fibers. Receptors on the effector organs. Excitatory and inhibitory actions of sympathetic and parasympathetic stimulation. Effects of sympathetic and parasympathetic stimulation on specific organs. Autonomic reflexes.

Function of the adrenal medullae. Relation of stimulus rate to degree of sympathetic and parasympathetic effect. Sympathetic and parasympathetic "tone".

Normal body temperatures. Heat production against heat loss. Role of the hypothalamus. Concept of a "set-point" for temperature control. Local skin temperature reflexes.

LAB 10

Chemical structure and synthesis of hormones.

Hormone secretion, transport, and clearance from the blood. Main mechanisms of action of hormones.

The hypothalamic-pituitary-adrenal/thyroid/gonadal axis.

LAB 11

Pituitary, thyroid gland , and adrenocortical hormones.

Pituitary gland and its relation to the hypothalamus. Anterior pituitary gland and its hormones. Posterior pituitary hormones.

Synthesis and secretion of the thyroid metabolic hormones. Physiologic functions of the thyroid hormones. Regulation of thyroid hormone secretion.

Assessment of the thyroid gland function – blood tests interpretation: thyroid-stimulating hormone (TSH), L-thyroxine (T4), triiodothyronine (T3), free fractions of T4 and T3 hormones.

Synthesis and secretion of adrenocortical hormones. Functions of the mineralocorticoids and glucocorticoids. Effects of cortisol on carbohydrate, protein and fat metabolism. Cortisol as a factor important in resisting stress and inflammation. Adrenal androgens.

LAB 12

Female and male physiology.

Reproductive and hormonal functions of the male. Spermatogenesis. Synthesis and functions of testosterone and other male sex hormones. Female hormonal system. Monthly ovarian cycle, function of the gonadotropic hormones, functions of the ovarian hormones - estradiol and progesterone.

Regulation of the female monthly rhythm - interplay between the ovarian and hypothalamic-pituitary hormones. Menopause.

The normal ovarian cycle – the analysis of specific changes in female sex hormones serum concentrations during the menstrual cycle.

LAB 13

Glucose metabolism. Calcium and phosphate metabolism.

Insulin and its metabolic effects. Effect of insulin on carbohydrate, fat and protein metabolism. Effect of insulin on growth mechanisms. Control of insulin secretion. Glucagon and its functions. Regulation of glucagon secretion. Somatostatin and its functions.

Assessment of carbohydrates metabolism: fasting blood glucose level and glucose tolerance tests interpretation.

Calcium in the plasma and interstitial fluid. Inorganic phosphate in the extracellular fluids.

Non-bone physiologic effects of altered calcium and phosphate concentrations in the body fluids. Deposition and absorption of bone-remodeling of bone. The role of vitamin D.

Parathyroid hormone - structure, functions, regulation of parathyroid hormone secretion. Calcitonin - structure, functions, regulation of calcitonin secretion.

LAB 14

Regulation of food intake.

Intake and output are balanced under steady-state conditions. Dietary balances.

Regulation of food intake and energy storage. Obesity.

LAB 15

Membrane physiology - an introduction to the cardiovascular and kidney physiology.

The main mechanisms of transmembrane movement of substances - diffusion versus active transport. Simple and facilitated (carrier-mediated) diffusion. Diffusion through protein channels. Gating of protein channels. Osmosis. Osmotic pressure. Osmolality. Primary active transport and secondary active transport. Sodium-potassium pump. Co-transport and counter-

transport.

Membrane potentials. The Nernst potential. Goldman equation. Origin of the normal resting membrane potential. Action potential. The stages of the action potential. Voltage-gated sodium and potassium channels – activation and inactivation. Refractory periods.

Lab 16

The liver as an organ.

Physiologic anatomy of the liver. Hepatic vascular and lymph systems. Bilirubin and urobilinogen.

Liver function tests (LFTs): total/direct bilirubin (TB/DB), alkaline phosphatase (AP), albumin, aspartate aminotransferase (AST = SGOT), alanine aminotransferase (ALT = SGPT), International Normalized Ratio (INR), gamma glutamyltranspeptidase (GGT). Metabolic functions of the liver.

Lab 17

Physiology of the digestive system.

General principles of gastrointestinal function- motility, nervous control and blood circulation. Propulsion and mixing of food in the alimentary tract. Secretory functions of the alimentary tract. Digestion and absorption in the gastrointestinal tract.

Processes in oral cavity. Characteristics and activity of oesophagus. Functions of stomach. Role of duodenum and other parts of small intestine. Functions of large intestine, especially of colon. Physiology of gastrointestinal disorders. Digestive and non-digestive role of pancreas.

LAB 18

Blood physiology - red blood cells.

Genesis, stages of differentiation, functions, structure, concentration, life span and destruction of red blood cells (RBCs).

Regulation of red blood cell production. Erythropoietin. Maturation of red blood cells. Vitamin B₁₂ and folic acid.

Structure, function and formation of hemoglobin. Iron metabolism. Iron metabolism tests interpretation.

Blood types and transfusion. Immune reactions of blood. Blood typing.

Basic blood values: RBCs count, HCT, HGB, MCV, MCH, MCHC, ESR.

LAB 19

Blood physiology - white blood cells.

General characteristics of leukocytes. Types of white blood cells. Neutrophils and macrophages. Diapedesis. Chemotaxis. Phagocytosis. Monocyte-macrophage cell system (reticuloendothelial system). Inflammation. Eosinophils. Basophils.

Types of immunity. Antigens. Humoral immunity and B lymphocytes. Nature, specificity, classes, and mechanisms of action of antibodies. Opsonization. Complement system. Cell-mediated immunity. Helper T cells. Cytotoxic T cells. Suppressor T cells. Antigen-presenting cell. MHC proteins. Tolerance of the acquired immunity system to one's own tissues. Role of thymus.

LAB 20

Blood physiology – hemostasis and blood coagulation.

Events in hemostasis. Vascular constriction. Formation of the platelet plug. The mechanisms of blood coagulation. Stages and pathways of blood coagulation. Role of vitamin K in coagulation. Antithrombin III and Heparin. Lysis of blood clots – plasmin. Blood coagulation tests.

LAB 21

Physiology of the heart.

Cardiac muscle as a syncytium. Action potentials in cardiac muscle - the ionic mechanisms of long action potential and the plateau phase. Refractory periods of cardiac muscle.

The specialized excitatory and conductive system of the heart –the ionic mechanism of automatic electrical rhythmicity; the different velocity of impulse conduction in particular portions of the system.

The cardiac cycle: function of the atria and the ventricles, periods, changes of pressure, volumes. The structure and function of the valves. Relationship of the heart sounds to heart pumping.

Regulation of heart pumping. The Frank-Starling mechanism. Control of the heart by the sympathetic and parasympathetic nerves. Effect of potassium and calcium ions on heart function. Effect of temperature on heart function.

Normal heart sounds.

LAB 22

Normal ECG.

Physiological basic of recording and interpretation of ECG. Genesis and types of intervals. Genesis and types of waves. Genesis of QRS complex.

Electrocardiographic leads. Bipolar limb leads. Augmented unipolar limb leads. Chest (unipolar) leads.

ECG recording by using bipolar limb leads at the time of apnoea. ECG recording by using bipolar limb leads after physical exercise. Heart sounds on the background of ECG. Determining the electrical axis from standard lead electrocardiograms.

ECG and action potentials of atrium and ventricle muscle and the conduction system. ECG and mechanical activity of heart.

LAB 23

Physiology of circulation (part 1).

Functional parts of the circulation. Volumes of blood in the different parts of the circulation. Pressures in the various portions of the circulation. Basic theory of circulatory function. Laminar flow of blood in vessels. Turbulent flow of blood under some conditions. Blood pressure. Resistance to blood flow.
Starling equilibrium for capillary exchange. Lymphatic system. Formation of lymph.
Methods for measuring systolic and diastolic pressures.
Arterial pulse examination. Location and name of pulses. Arterial pulse features.
Different factors influencing on arterial pressure and pulse: body position, rapid position change (orthostatic test), gravity, the pressure in the chest, dynamic and static physical exercise, freezing probe.

LAB 24

Physiology of circulation (part 2).

Role of the nervous system in rapid control of arterial pressure. Reflex mechanisms for maintaining normal arterial pressure. Control of cardiac output by venous return. Role of the Frank-Starling mechanism of the heart cardiac output regulation. Tissue metabolism as a condition regulating local blood flow.
Total body circulatory readjustments during exercise.
Characteristics of the cerebral blood flow. Autoregulation of cerebral blood flow. Cerebral microcirculation.
Cerebrospinal fluid system. Formation, flow, and absorption of cerebrospinal fluid. Cushioning function of the cerebrospinal fluid. Cerebrospinal fluid pressure. Blood-cerebrospinal fluid and blood-brain barriers.
Coronary circulation. Normal coronary blood flow. Special features of cardiac muscle metabolism.

LAB 25

The respiratory system physiology (part 1).

Mechanics of pulmonary ventilation. Respiratory muscles. Surfactant, surface tension, and collapse of the alveoli.
Pulmonary volumes and capacities. Recording changes in pulmonary volume - spirometry.
Nervous and local control of the bronchiolar musculature. Cough reflex. Respiratory functions of the nose. Vocalization.
Physiologic anatomy of the pulmonary circulatory system. Pressures in the pulmonary system. Blood volume of the lungs.
Blood flow through the lungs and its distribution.
Capillary exchange of fluid in the lungs, and pulmonary interstitial fluid dynamics.
Recording the peak expiratory flow by using Mini-Wright Peak Flow Meter.
Spirometry measures used in diagnosing and monitoring lung diseases.

LAB 26

The respiratory system physiology (part 2).

Diffusion of gases between the gas phase in the alveoli and the dissolved phase in the pulmonary blood.
Diffusion of gases through the respiratory membrane. The main principles of diffusion of O₂ and CO₂ between the alveoli and the pulmonary capillary blood and between peripheral tissue cells and capillaries. Hemoglobin dissociation curve.
Respiratory centers. Dorsal respiratory group of neurons. A pneumotaxic center. Ventral respiratory group of neurons. The Hering-Breuer inflation reflex. Direct chemical control of respiratory center activity by carbon dioxide and hydrogen ions.
Peripheral chemoreceptor system for control of respiratory activity.
Regulation of respiration during exercise.

LAB 27

Physiology of kidney (part 1).

Functional anatomy of kidney. Principles of nephron functioning: plasma filtration in the glomerulus, selective reabsorption in tubules, tubular secretion, urine secretion. Plasma filtration in glomeruli: structure and feature of filtration membrane, net filtration pressure, amount and composition of glomerular filtrate.
Regulation of GFR (glomerular filtration rate) and RBF (renal blood flow).
Processing glomerular filtrate in tubules.

LAB 28

Physiology of kidney (part 2).

Tubular reabsorption regulation. Renal mechanisms of blood osmolarity regulation.
Renal clearance and its clinical significance. Mechanisms of urine secretion.
Endocrine functions of kidney.

LAB 29

Acid - base balance.

The definitions of acids and bases. Defenses against changes in hydrogen ion concentration: buffers (bicarbonate buffer system, phosphate buffer system, proteins), lungs, and kidneys.
Respiratory regulation of acid-base balance.
Renal control of acid-base balance.
Arterial Blood Gases (ABG) tests interpretation.

LAB 30 (the last lab of the second semester)

Integrative physiology. Backlogs.

Obligatory literature for Lecture:

The Textbook of Medical Physiology, A.C. Guyton and J.E. Hall, 13th edition, 2016

Complementary literature for Lecture:

The Textbook of Medical Physiology, W.F. Boron and E.L. Boulpaep, 3rd edition, 2016

Obligatory literature for Lab classes:

The Textbook of Medical Physiology, A.C. Guyton and J.E. Hall, 13th edition, 2016

Complementary literature for Lab classes:

The Textbook of Medical Physiology, W.F. Boron and E.L. Boulpaep, 3rd edition, 2016

Requirements for didactic aids (multimedia projector, movie camera, etc.)

Laptop, Multimedia projector, TV

Conditions for obtaining a credit for the subject:

The overall course grade will be determined by the results of 28 partial quizzes, 1 in-class activity and 1 final comprehensive written exam, which verify if the student acquired the knowledge, of the information as stated in the syllabus. A passing score confirms the satisfactory fulfillment of course requirements and is based on student's class attendance and mid-semester grades.

Exams

- Questions for the exams will be drawn from reading, lecture and lab activities.
- Regular classroom attendance, participation in class discussion and studying according to class objectives will contribute to student's success on the exams.
- In order to pass this course, each student must pass the final written examination with a grade of 60% or higher. In addition, each student must earn an overall grade of 60% or higher for each section of the course. There will be no exceptions to this rule.
- Exams must be taken on scheduled dates and times. If illness or emergencies prevent a student from meeting deadlines, the coordinator must be notified before the exam date. A different exam (format and/or questions) may be substituted for exams missed for any reason, potentially including a completely essay-based exam.
- Make-up work will be at the instructor's discretion.
- The use of electronic devices with electronic data bases is not permitted during written or oral exams.
- An attempt of electronic or mechanical copying, photocopying, recording, or otherwise during exams is equal with a failed exam. Such an attempt will be immediately reported to the Dean's Office.

Comprehensive Final Exam

- A comprehensive final exam for all lecture and lab topics.
- Exam takes place during the end-of-term examination sessions.
- The student is informed about the criteria of evaluation before approaching the exam, additionally, the student has the right to have an insight into his/her paper within 7 days from the release of examination results. If the exam is conducted in the form of a test, there is one set of questions for all students taking it at the same time.
- The date of the comprehensive exam ought to be announced at least 4 weeks before the examination session and at least 10 days before the make-up session. If a student does not appear at the exam, it is recorded in the protocol as "absent". A justification ought to be handed in or sent to the Dean's office within 3 days from the exam date. In case of unexcused absence, the Dean writes unsatisfactory mark (fail). After receiving Dean's approval, the examiner sets a new date. The same rules apply to pass, make up and commission exams. Exam results are available within up to 7 days but no later than 3 days before the make-up exam.

Grading scale:**Point system**

Labs (except the 15th lab of the 1st semester and the 15th lab of the 2nd semester) will be entered with a quiz consisting of 10 questions. The maximal number of points possible to obtain from the labs is 280 points. The maximal number of points possible to obtain through one semester equals 140 points. Only a Student who gains at least 84 points (60% of the number of 140 points) can pass a semester. Students who pass both semesters can take the Final Exam.

Points collected during the first semester are recalculated to a grade reported to the Dean's Office:

(2) failed	less than 84 points
(3) satisfactory	84-99 points
(3.5) fairly good	100-109 points
(4) good	110-119 points
(4.5) better than good	120-129 points
(5) very good	130-140 points

A Student who gains less than 84 points at the end of each semester is obliged to pass a material in two additional written exams in order to pass the semester. Only a Student who gains at least 60% from the corrective exam will pass the semester.

The criteria of the final score in human physiology include:

70-80%: Final Exam;

0-15%: Total number of points obtained through the whole year:

5%: Frequency in the labs and lectures, attending the labs with the group to which a Student was signed up and having no unexplained absences:

Ad.1) The scores which a Student receives from the Final Exam are as follows:

- (2) failed- less than 60 points,
- (3) satisfactory- 60-69 points,
- (3.5) fairly good- 70-74 points,
- (4) good- 75-84 points
- (4.5) better than good- 85-89 points
- (5) very good- 90-100 points

The scores which a Student receives from the Final Exam will be recalculated according to the rules described below:

(3): 70% (3.5): 72.5% (4): 75% (4.5): 77.5% (5): 80%.

Ad.2) The total number of points obtained through the whole year will be recalculated to the final score according to the rules described below:

168-180: 0% **181-195:** 2.5% **196-209:** 5% **210-223:** 7.5% **224-237:** 10%
238-251: 12.5% **252 or more:** 15%

Ad.3) The additional 5% will be added for punctuality, coming with the proper Students group-to which a Student was signed up and having no unexplained absences (three conditions must be fulfilled!!).

The additional percentages concerning points 2 and 3 from the above criteria will be added only in case of obtaining the minimum number of points received through the whole year and successfully passed the Final Exam for the first time (June). Retakes of the Final Exam deny all the rights to receive all the additional percentages described in the points 2 and 3 in the criteria of the final score.

After adding all of the percentages from the Final Exam, the total number of points obtained through the whole year and frequency the score will be calculated as follows:

- 92.5-100%: 5 (very good)
- 87.5-92 %: 4.5 (better than good)
- 82.5-87%: 4 (good)
- 77.5-82%: 3.5 (fairly good)
- 70-77%: 3 (satisfactory)

The scores which a Student receives from the both retake exams are as follows:

- 2 (failed) less than 70 points
- 3 (satisfactory) 70-79 points
- 3.5 (fairly good) 80-84 points
- 4 (good) 85-90 points
- 4.5 (better than good) 91-95 points
- 5 (very good) 96-100 points

Attendance: Attendance is required. Student must participate in lab sessions according to the schedule. The lectures are obligatory. Students are allowed to have only one unjustified absence to lectures per one semester. In case of an illness an appropriate medical certificate has to be provided. Important causes of other absences (e.g. life circumstances) must be documented as well. The labs are obligatory. Students are allowed to have only one unjustified absence to labs per one semester. In case of an illness an appropriate medical certificate has to be provided. Important causes of other absences (e.g. circumstances) must be documented as well. In case of having more than one unjustified absence per labs in a semester, a Student will not pass a semester. A medical certificate or other documents must be provided to respective Teachers not later than within two weeks from the last evidenced day of an absence to labs or lectures. If an absence is justified, a Student is obliged to pass a material from the respective lab within four weeks from the date of a missed lab. In the case of absences with excuse in the form of seminars, labs or practical classes, the content of classes the student missed shall be made up according to the schedule given by the instructor. Participation performance will not be penalized for excused absences. If an absence is unjustified, a Student cannot take a partial test. A Student has right to have access to quiz results within 7 days after the date of taking a quiz. To obtain an access a Student is obliged to submit a formal written request to an appropriate Teacher.

Tardiness: Students are expected to arrive at class on time. Delayed Students can enter the class only if the time of delaying does not exceed 15 minutes from the moment a lab has been started. In case of delays more than 15 minutes, Students who would like to take a lab during the same week with another group must immediately contact with an appropriate Teacher to receive a formal permission. If such a change does not interfere with a normal course of a lab, and the missed lab is not the last lab in a week lab cycle, a Teacher can give to a requesting Student an appropriate permission.

Uniforms: Students will be in uniform the first day of class. Students are expected to attend class in white lab coat and lab shoes or shoe covers (otherwise student won't be able to participate in the lab). Students are not permitted to wear heavy outside coats or jackets to any lab.

Using mobile phones during the labs is forbidden. Eating and drinking during the labs are prohibited.

Missed exams/Assignments/Make-up policy: Student not present to take an assigned examination may receive a grade of zero (0) for that examination. The student may be allowed to make-up an examination under the following circumstances:

- Absence is due to serious illness/hospitalization of the student or an immediate family member. Documentation by a health care provider will be required at the time the student requests a make-up exam for the day of illness.
- Absence is due to family emergency, verified by a note from the professional person in attendance.
- Absence is due to a death in the immediate family. Documentation will be required.
- An absence that the faculty and/or Department Head deems as unavoidable.

To be eligible for a make-up exam in the above circumstances, the student must notify their instructor PRIOR to the absence, and must make arrangements within 48 hours after the absence for the retake. Faculty has the right to offer an alternative form of the exam.

Course Coordinator:

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Signature of the head of the department/clinic

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Uniwersytetu Medycznego w Lublinie

dr hab. n. med. Teresa Małecka-Massalska

Dean's signature

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Date of submission:

