Pomeranian Medical University in Szczecin

SYLLABUS of the MODULE (SUBJECT)
General Information

Module title: PHYSIOLOGY 2023/2024	
Module type	Mandatory
Faculty PMU	Faculty of Medicine and Dentistry
Major	Medicine
Level of study	long-cycle (S2J)
Mode of study	full-time studies
Year of studies, semester	Year 2, semester 3, 4
ECTS credits (incl. semester breakdown)	20
Type/s of training	seminars (76 h)/practicals (100 h)/e-learning (14 h)
Form of assessment*	☒graded assessment: ☒descriptive ☒test ☒practical ☒oral ☒non-graded assessment ☒final examination ☐descriptive ☒test ☒practical ☐oral
Head of the Department/ Clinic, Unit	prof. dr hab. n. med. Andrzej Pawlik kzfizjol@pum.edu.pl
Tutor responsible for the module	dr n.med Tomasz Sroczyński tomasz.sroczynski@pum.edu.pl, tel. 91 466 16 11
Department's/ Clinic's/ Unit's website	https://pum.edu.pl/uniwersytet/dydaktyka_i_kliniki_katedry_zaklady_i_pracownie/wmis/katedra_i_zakad_fizjologii/
Language	English, Polish

* replace ☐ into ☒ where applicable

Detailed information

Module objectives		**We expect that after the completion the course of physiology the student will**: 1. Understand vital physiological processes and mechanisms in particular cells, tissues, organs and organ systems in normal conditions and be able to explain the mechanisms of regulation of physiological functions. 2. Be able to define health, describe the conditions of homeostasis and its basic parameters, to explain the regulatory and compensatory mechanisms. 3. Prove that adaptive ability of the organism to environmental changes, physical, mental and emotional workload are limited and individually different. Matching of lifestyle to to individual abilities of the organism. 4. Know the reference values of basic physicochemical parameters of the internal environment of the organism as well as morphological and physiological variables. 5. Be able to distinguish between the state of health and dysfunctions and disorders; master the knowledge to understand the pathological processes and clinical symptoms. 6. Be able to associate the knowledge concerning physiological processes with practical laboratory tests and clinical trials.
Prerequisite /essential requirements	Knowledge	Knowledge concerning the morphology of tissues and organs of the human body. Knowledge concerning the function of the cell, the function of intracellular structures and organelles. Knowledge concerning intercellular communication and mechanisms of the signal transduction. Knowledge concerning basic concepts and biochemical reactions occurring intra- and extracellularly and main metabolic pathways.
	Skills	Using the optical microscope. Use of databases.
	Competences	Ability to cooperate in teams to describe the observed phenomena and find conclusions together. Acceptance of ethical standards. Ability of self-education and critical evaluation of information sources.

Description of the learning outcomes for the subject /module

No. of learning outcome	Student, who has passed the (subject) knows /is able to /can:	SYMBOL (referring the standards)	Method of verification of learning outcomes*
W01	describe water-electrolyte equilibrium in biological systems	K_B.W1	ET, W, O, PS, K, RZĆ
W02	describe acid-base equilibrium and buffer mechanisms and their role in systemic homeostasis	K_B.W2	ET, W, O, PS, K, RZĆ
W03	knows physical rules regulating liquid flow and agents affecting blood flow and vascular resistance	K_B.W5	ET, W, O, PS, K, RZĆ
W04	knows physicochemical and molecular basis of the action of sensory organs	K_B.W7	ET, W, O, PS, K, RZĆ

W05	knows the ways of cell-to-cell and cell-extracellular matrix communication ,intracellular transductions signal pathways and examples of these processes responsible for carcinogenesis and other pathologies	K_B.W21	ET, W, O, PS, K, RZĆ
W06	knows such processes as: cell , proliferation, differentiation and aging, cell cycle, apoptosis and necrosis and their significance with regard to body functions	K_B.W22	ET, W, O, PS, K, RZĆ
W07	has the basic knowledge of stem cells and their application in medicine	K_B.W23	ET, W, O, PS, K, RZĆ
W08	knows the bases for excitation and conduction in nervous system and higher nervous activities as well as the physiology of striated and non-striated muscles and blood functions	K_B.W24	ET, W, O, PS, K, RZĆ
W09	knows modes of action and regulatory mechanisms of all human organs and systems, incl. circulatory system, respiratory system, alimentary system, urinary system and dermal integument and understands relationships between these	K_B.W25	ET, W, O, PS, K, RZĆ
W10	knows process and regulation of reproductive functions in men and women	K_B.W27	ET, K
W11	knows aging mechanisms of human body	K_B.W28	ET, W, O, PS, K, RZĆ
W12	knows basic quantitative parameters of efficiency of particular systems and organs, incl. scope, standard and demographic factors affecting values of such parameters	K_B.W29	ET, W, O, PS, K, RZĆ
W13	knows relationship between factors disturbing equilibrium of biological processes and physiological and pathophysiological changes	K_B.W30	ET, W, O, PS, K, RZĆ
U01	describes changes to organism functions in the case of homeostasis disturbance, in particular, determines organism response to exercise, exposure to high and low temperature, blood or water loss, sudden erect position, transition from sleep to waking state	K_B.U7	ET, W, O, PS, K, RZĆ, S
U02	uses simple measuring instruments and evaluates the accuracy of measurements taken	K_B.U9	PS, RZĆ
U03	uses databases, incl. on-line bases and searches for information required by means of available tools	K_B.U11	S, PS, RZĆ
U04	conducts simple tests in order to evaluate the human organism as a system of stable regulation (load test, exercise test); interprets numerical data on basic physiological variables	K_B.U08	S, PS, RZĆ
K01	is aware of his/her own limitations and knows when to refer to experts	K_K17	assessed on an ongoing basis during classes
K02	takes a health and physical activity oriented attitude	K_K07	As above
K03	demonstrates the awareness for self-education, understands the need for continuing professional education, can inspire and organize learning processes in others	K_K03	As above
K04	adheres to proper examiner/examinee relationship while performing functional tests and observations	K_K05	As above
K05	is aware of cultural and social differences affecting	K_K09	As above

	individual interpretations of living standards		
K06	cares for safety of colleagues, the environment and himself/herself	K-K15	As above

Table presenting LEARNING OUTCOMES in relation to the form of classes								
No. of learning outcome	**Learning outcomes**	**Type of training**						
		Lecture	**Seminar**	**Practical classes**	**Clinical classes**	**Simulations**	**E-learning**	**Other…**
W01	K_B.W1		X	X				
W02	K_B.W2		X	X				
W03	K_B.W5		X	X				
W04	K_B.W7			X				
W05	K_B.W21		X	X				
W06	K_B.W22		X	X				
W07	K_B.W23		X	X				
W08	K_B.W24		X	X				
W09	K_B.W25		X	X				
W10	K_B.W27		X	X				
W11	K_B.W28			X				
W12	K_B.W29		X	X				
W13	K_B.W25		X	X				
U01	K_B.U7			X				
U02	K_B.U9			X				
U03	K_B.U11			X				
U04	K_B.U08			X				
K01	K_K17		X	X				
K02	K_K07		X	X				
K03	K_K03		X	X				
K04	K_K05			X				
K05	K_K09			X				
K06	K-K15			X				

Table presenting TEACHING PROGRAMME			
No. of a teaching programme	**Teaching programme**	**No. of hours**	**References to learning outcomes**
Winter semester			
Lectures			
Seminars			
TK01	Homeostasis and its maintenance. Methods of intercellular communication. The concept of ligands, agonists, antagonists and ligand receptors; signal transduction in the cell.	10	W01, W02, W05, K01, K02, K03
TK02	The role of hormones in the regulation of organ functions, metabolic processes, and the growth and differentiation of tissues.	4	W05, W09, W10, K01, K02, K03
TK05	Stem cells in medicine	2	W06, W07, K01, K02, K03

TK03	Reproductive functions in women and men	3	W08, K01, K02, K03
TK04	Physiology of blood	6	W01,W06, W07, W12, W13, K01, K02, K03
TK06	Autonomic nervous system: classification, mediators, receptors and their agonists and antagonists. Effect of the sympathetic and parasympathetic systems on organs and tissues	5	W08, K01, K02, K03
	Central nervous system – sensory and motor function. Higher functions of brain. Perception and modulation of pain.	15	W08, K01, K02, K03
Practical classes			
TK01	Homeostasis and its maintenance.	2	W01, W02, W05, U03, K01, K02, K03
TK02	General characteristics of regulation of the endocrine system; feedback mechanisms in the endocrine system; Mechanisms of hormone release and action. Hormonally active organs. The role of hormones in the regulation of organ functions, metabolic processes, and the growth and differentiation of tissues.	4	W05, W10, W13, U03, U04, K01, K02, K03, K04, K05
TK03	Physiology of blood. Formed elements of blood: reference values and functions. Composition and role of plasma. Blood types. Haemostasis. Haematopoiesis. Physiology of stem cells and their role in regenerative processes.	15	W06, W07, W12, U01, U02, U03, U04, K01, K02, K03, K04, K05, K06
TK04	Total body water (TBW) and its distribution. Principles of regulation the water-mineral balance and its disturbances. Water balance.	2	W01, U01, U02, U03, U04, K01, K02, K03, K04, K05
TK05	Physiology of excitable tissues. Excitatory and inhibitory transmitters – generation of EPSP and IPSP. Synaptic modulators. The function of neurons, skeletal and smooth muscles and cardiac muscle cells	8	W08, U01, U02, U03, U04, K01, K02, K03, K04, K05
TK06	Autonomic nervous system. Effects of sympathetic and parasympathetic system on tissues and organs	2	W08, U03, K01, K02, K03, K04, K05
TK07	Central nervous system – afferent and efferent parts of the nervous system. Pain perception and modulation. Selected elements of the examination of the central nervous system	9	W08, U01, U02, U03, U04, K01, K02, K03, K04, K05, K06
TK08	Physiology of senses	8	W04, U01, U02, U03, U04, K01, K02, K03, K04, K05, K06
Summer semester			
Seminars			
TK01	Physiology of heart	4	W09, W12, W13, K01, K02, K03
TK01	Physiology of heart – phases of cardiac cycle, heart sounds, volumes and pressure of cardiac chambers. Internal and external regulation of heart function. Coronary circulation.	9	W03, W09, W12, W13, K01, K02, K03
TK02	Action of the cardiovascular system Regulation of the arterial blood pressure and vascular resistance. Arterial and venous system. Examination of the vascular system. Nervous, humoral, hormonal regulation of action of the vascular system.	9	W09, W12, W13, K01, K02, K03

TK03	Function of the respiratory system. Ventilation of lungs. Compliance of lungs Respiratory resistance. Spirometry. Regulation of the respiratory system.	6	W09, W12, W13, K01, K02, K03
TK04	Functions of kidneys. Action of glomerulus, proximal convoluted tubule, loop of Henle, distal part of the nephron, collecting duct. Mechanisms controlling urine volume. Composition of urine.	6	W09, W12, W13, K01, K02, K03
TK05	Processes occurring in following parts of the gastrointestinal system. Motor and secretory activity of the gut. Gastrointestinal hormones. The role of the liver and pancreas in gastrointestinal system.	7	W09, W12, W13, K01, K02, K03
TK02	Smell and taste	2	W09, W12, W13, K01, K02, K03
TK03	Aging and physiology	2	W09, W12, W13, K01, K02, K03
Practical classes			
TK01	Physiology of heart – phases of cardiac cycle, heart sounds, volumes and pressure of cardiac chambers. Internal and external regulation of heart function. Coronary circulation. Adaptation of the heart to physical exercise. Assessment of SV, HR, Q. ECG.	12	TK01
TK02	Action of the cardiovascular system Regulation of the arterial blood pressure and vascular resistance. Arterial and venous system. Examination of the vascular system. Nervous, humoral, hormonal regulation of action of the vascular system. Adaptation of the cardiovascular system to physical exercise.	15	TK02
TK03	Function of the respiratory system. Ventilation of lungs. Compliance of lungs Respiratory resistance. Spirometry. Regulation of the respiratory system. Adaptation of the respiratory system to physical exercise.	7	TK03
TK04	Functions of kidneys. Action of glomerulus, proximal convoluted tubule, loop of Henle, distal part of the nephron, collecting duct. Mechanisms controlling urine volume. Composition of urine.	7	TK04
TK05	Functions of kidneys and respiratory system in homeostasis of the organism.	2	TK05
TK06	Processes occurring in following parts of the gastrointestinal system. Motor and secretory activity of the gut. Gastrointestinal hormones. The role of the liver and pancreas in gastrointestinal system.	2	TK06
TK07	General an basal metabolic rate and their components. Hormonal and nervous regulation of the body metabolism. Principles of rational nutrition. Assessment of body mass and body proportions (body mass, LBM, BMI, WHR). Overnutrition. Obesity – classification, reasons. Abdominal obesity. Neurohormonal regulation of food intake.	2	TK07
TK08	Thermoregulation - the organism's response to the changing thermal conditions of the external environment. Thermolysis and thermogenesis. Thermoregulation centre. Effectors of the thermostat.	1	TK08
TK09	General physical efficiency and methods of its assessment. Maximum oxygen uptake (VO_2max,	1	TK09

	oxygen threshold).		
TK10	Physiology of aging	1	TK10

Booklist
Obligatory literature:
1. Textbook of Medical Physiology – Arthur C. Guyton, John E. Hall.
2. Human Physiology – Dee U. Silverthorn.
Supplementary literature:
1. Review of Medical Physiology – William F. Ganong.
2. Principles of Physiology – Berne & Levy

Student's workload	
Form of student's activity (in-class participation; activeness, produce a report, etc.)	Student's workload [h]
	Tutor
Contact hours with the tutor	176
Time spent on preparation to seminars/ practical classess	70
Time spent on reading recommended literature	60
Time spent on writing report/making project	20
Time spent on preparing to colloquia/ entry test	40
Time spent on preparing to exam	60
Other (e-learning)	14
Student's workload in total	440
ECTS credits for the subject (in total)	**20**
Remarks	

* Selected examples of methods of assessment:
EP – written examination
EU – oral examination
ET – test examination
EPR – practical examination
K – colloqium
R – report
S – practical skills assessment
RZĆ – practical classes report, incl. discussion on results
O – student's active participation and attitude assessment
SL – lab report
SP – case study
PS - assessment of student's ability to work independently
W – entry test
PM – multimedial presentation
other…