

## DESCRIPTION OF THE COURSE OF STUDY

<b>Course code</b>	0912-7LEK-B2.5-PzC	
<b>Name of the course in</b>	Polish	<b>Fizjologia z cytofizjologią</b>
	English	Physiology and cytophysiology

### 1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

<b>1.1. Field of study</b>	medicine
<b>1.2. Mode of study</b>	Full-time
<b>1.3. Level of study</b>	Uniform Master's studies
<b>1.4. Profile of study*</b>	General academic
<b>1.5. Specialization*</b>	lack
<b>1.6. Unit running the course of study</b>	Faculty of Medicine and Health Sciences
<b>1.7. Person/s preparing the course description</b>	dr. hab. n. med., prof. UJK Anna Polewczyk
<b>1.8. Person responsible for the course of study</b>	dr. hab. n. med., prof. UJK Anna Polewczyk
<b>1.9. Contact</b>	apolewczyk@ujk.edu.pl

### 2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

<b>2.1. Affiliation with the module</b>	Scientific basis of medicine
<b>2.2. Language of instruction</b>	mandatory
<b>2.3. Semesters in which the course of study is offered</b>	English
<b>2.4. Prerequisites*</b>	3rd and 4th semester;
	Anatomy, Histology

### 3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

<b>3.1. Form of classes</b>	LECTURE : 50 ,CLASSES – 50, LABORATORIES- 60	
<b>3.2. Place of classes</b>	Lecture /Classes/ Laboratories - Courses in the teaching rooms of the UJK	
<b>3.3. Form of assessment</b>	LECTURE –exam, CLASSES – credit with grade, Laboratories - credit with grade	
<b>3.4. Teaching methods</b>	Practical classes, conversational lecture, discussion. Computer programmes provided in the scope of Physiology classes	
<b>3.5. Bibliography</b>	<b>Required reading</b>	1.Ganong W.F.: Review of Medical Physiology, Lange Medical Book, 21st ed., 2003, ISBN 0071402365 10szt
	<b>Further reading</b>	2.Guyton A.C.: Textbook of Medical Physiology, Saunders, 10th ed., 2000, ISBN 072168677

### 4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED TEACHING OUTCOMES

#### 4.1. Course objectives (including all forms of classes)

**Physiology**- it is the study of phenomena, reactions, actions, mechanisms and laws of life. Not only does it explain individual molecular functions of subcellular structures, cells, tissues, organs and systems but it also explains how they depend on each other throughout the body.

#### The aim of the course:

- Learn the basics of general human physiology including elementary aspects of cell physiology.
- Enable to understand the principles of functioning of the human organism by developing habit of scientific thinking as well as logical interpretation of the facts.

#### The aim is accomplished by:

- Assimilation of theoretical information about the functions of individual organs and systems.
- Assessment and interpretation of the outcomes of, conducted by the students, experiments as well as practical classes.

Independent computer work using interactive programs of the physiology of the nervous system, muscular, cardiovascular, respiratory, renal, acid-base balance and water-electrolyte, endocrine and digestive systems as well as multimedia computer simulation, experimental and laboratory programs.

#### 4.2. Detailed syllabus (including all forms of classes)

##### Interactive lectures with presentation of the clinical cases: 50 hours

###### I semester lectures - 25 hours

1. **Cardiac Muscle;** The Heart as a Pump and Function of the Heart Valves. Resting and functional potential of cardiomyocytes. Action potential of complex conducting tissue.
2. Physiological basis of electrocardiography
3. Normal electrocardiogram
4. Myocardial contraction. Cardiac cycle. Regulation of heart activity
5. Overview of the Circulation; Biophysics of Pressure, Flow, and Resistance. Functions of the Arterial and Venous Systems. The Microcirculation and Lymphatic System.
6. **The Nervous System:** General Principles and Sensory Physiology. Organization of the Nervous System, Basic Functions of Synapses, and Neurotransmitters Sensory Receptors.
7. **The Nervous System:** Muscle. Regulation of motor functions.
8. **Physiology of hematopoietic system. Physiology of the hematopoietic system.**
- 10 Exam –I semester- 1 h

###### II semester lectures - 25 hours

9. Hematopoietic system. Haemostasis
10. **Respiratory system.** Mechanism of breathing.
11. **The Body Fluids and Kidneys.** Water-mineral balance.
12. **Gastrointestinal Physiology.** General Principles of Gastrointestinal Function: gastrointestinal motility.
13. Secretory functions of the digestive glands. Liver function.
14. **Endocrinology and Reproduction.** Introduction to Endocrinology. Pituitary Hormones and Their Control by the Hypothalamus.
15. Thyroid Metabolic Hormones. Adrenocortical Hormones (pancreatic hormones).
16. **Sports Physiology. Adaptive physiology.**
17. **Exam**

##### Classes: 50 hours

###### I semester 25 hours Classes

1. Cardiac electrophysiology. Electrocardiography.
2. Systolic myocardial function.
3. Blood and body fluids circulation. Cardiovascular control Blood and body fluids circulation. Cardiovascular control.
4. Regulation of the circulation in the different organs and functional status of the organism
5. Exam including classes material in the field of cardiovascular system.
6. Physiology of the nerve cell. Functional potential of the nerve cell. Conductivity in synapses and neuromuscular junction .
7. Muscles.
8. Reflexes. The somatosensory feeling. The regulation of motor functions.
9. The autonomic nervous system.
10. The organ of sight, hearing, balance, taste, smell.
11. Exam including classes material in the field of neurophysiology.

###### II semester 25 hours Classes

1. Blood components and the functions of the cellular elements. Blood groups. Haemostasis.
2. Function of respiratory system
3. Genesis of the respiratory rhythm and regulation of breathing
4. The physiology of the kidney.
5. The acid-base and water-electrolyte balance.
6. A written test covering classes material in the field of physiology of blood, respiratory system, kidney.
7. The digestive system. Motor action, digestion, absorption. The energy balance of the body.
8. The hormonal system: Hypothalamus. Hypophysis. Pancreas. Thyroid. Adrenal cortex. The adrenal medulla. Calcium homeostasis. Sex hormones.
9. Physical exertion.
10. A written exam including classes material in the field of digestive system, hormonal system and ophysical exertion

##### Laboratory : 60 hours

###### I semester 30 hours Laboratory

- 1 Electrophysiology of the heart. ECG- practical aspects
- 2 Practical assessment of systolic function of the heart and hemodynamic cycle

- 3 Circulation of the blood and organ's fluid
- 4 Exam- circulatory system
- 5 Practical aspect of physiology of the nerve cells. The assessment of the conductivity in the neuromuscular junctions.
- 6 Muscles- examinations of sensation and reflexions
- 7 The autonomic nervous system- examination of vision and hearing
- 8 An exam including laboratory material in the field of electrophysiology, systolic function of the heart and neurophysiology.

### II semester 30 hours Laboratory

1. Blood components. Main functions of morphotic elements.
2. Respiratory system- genesis of the rhythm of respiration
3. Respiratory system- spirometry
4. Exam – respiratory system-
5. Kidney. The acid-base and water-electrolyte balance- practical assessment.
6. Exam – kidney
7. Digestive system. Practical knowledge of the digestion mechanisms and gastrointestinal hormones.
8. Exam –digestive system
9. Hormonal system- diagnostic aspect. Reproductive system.
10. An exam including laboratory material in the field of the hormonal system

### 4.3 Education outcomes in the discipline

Code	A student, who passed the course	Relation to teaching outcomes
within the scope of <b>KNOWLEDGE:</b>		
<b>W 1</b>	knows basic cellular structures and their functional specifications;	A.W4.
<b>W 2</b>	describes the water and electrolyte balance in biological systems;	B. W1
<b>W 3</b>	describes acid-base homeostasis and mechanisms of buffers and their significance in systemic homeostasis;	B.W2.
<b>W 4</b>	knows and understands the concepts of solubility, osmotic pressure, isotonia, colloidal solutions and Gibbs-Donnan effect;	B.W3.
<b>W 5</b>	knows the physical, chemical and molecular basis of how the organs of the senses function;	B.W7.
<b>W 9</b>	describes basic catabolic and anabolic pathways, methods of their regulation and the influence of genetic and environmental factors	B.W15.
<b>W10.</b>	knows the metabolic profiles of basic organs and systems;	B.W16.
<b>W11</b>	knows the concepts of oxidation potential of the organism and oxidative stress;	B.W17.
<b>W12.</b>	know the enzymes involved in digestion, the mechanism of production of hydrochloric acid in the stomach, the role of bile, the course of absorption of the products of digestion and disorders associated with them	B.W18.
<b>W13</b>	Knows the consequences of poor nutrition including long-term starvation, taking too large meals and the use of unbalanced diet.	B.W19.
<b>W14.</b>	Knows the consequences of deficiency of vitamins or minerals, as well as their excess in the body.	B.W20.
<b>W16.</b>	knows the processes such as cell cycle, proliferation, differentiation, and cell aging, apoptosis and necrosis, and their importance for the functioning of the body;	B.W22.
<b>W17</b>	knows basic problems concerning stem cells and their use in medicine;	B.W23.
<b>W18.</b>	knows basic principles of stimulation and conduction in the nervous system and higher nervous functions, as well as physiology of striated and smooth muscles and functions of blood;	B.W24.
<b>W19.</b>	knows the functions and mechanisms of regulation of all organs and systems of the human body, including the: circulatory, respiratory, digestive, and urinary systems as well as skins and understands the dependence between them;	B.W25.
<b>W20.</b>	knows the mechanism of hormones' functioning and the consequences of disorders of hormonal regulation;	B.W26.
<b>W 21.</b>	knows the reproductive function in women and men;	B.W27.
<b>W22.</b>	knows the mechanisms of aging;	B.W28.

<b>W23.</b>	knows the basic quantitative parameters describing the performance of individual systems and organs, including the range of norms and demographic factors affecting the value of these parameters;	B.W29.
<b>W24.</b>	knows the relationship between the factors that disrupt the equilibrium of biological processes and physiological and pathophysiological changes;	B.W30.
<b>W25.</b>	knows the genetics of blood groups and serological conflict in Rh system	C.W6.
within the scope of <b>ABILITIES:</b>		
<b>U1.</b>	operates the optical microscope, also making use of immersion;	A.U1.
<b>U2.</b>	describes changes in the functioning of the organism in case of disruption of homeostasis, in particular determines its integrated response to exercise, exposure to high and low temperature, loss of blood or water, sudden vertical position, transition from sleep to wakefulness;	B.U7.
<b>U3.</b>	performs a simple function tests evaluating the human body as a system stable regulation (stress tests); interprets the figures on the basic physiological variables;	B.U8.
<b>U4.</b>	applies basic laboratory techniques, such as: qualitative analysis, titration, colorimetry, pehametry, chromatography, electrophoresis of proteins and nucleic acids;	B.U9.
<b>U5.</b>	operates simple measuring instruments and evaluates the accuracy of measurements;	B.U10.

#### 4.4. Methods of assessment of the intended teaching outcomes

Teaching outcomes (code)	Method of assessment (+/-)																				
	Written exam - test*			Test*			Project* Presentation			Effort in class*- discussion			Practical test*			Group work*			Others* Attendance		
	Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes					
	L	C	...	L	C	L a b	L	C	...	L	C	L a b.	L	C	L a b.	L	C	...	L	C	..
W 1	+	+									+	+							+	+	+
W 2	+	+									+	+							+	+	+
W 3	+	+									+	+							+	+	+
W 4	+	+									+	+							+	+	+
W 5	+	+									+	+							+	+	+
W 9	+	+									+	+							+	+	+
W10.	+	+									+	+							+	+	+
W11	+	+									+	+							+	+	+
W12.	+	+									+	+							+	+	+
W13	+	+									+	+							+	+	+
W14.	+	+									+	+							+	+	+
W16.	+	+									+	+							+	+	+
W17	+	+									+	+							+	+	+
W18.	+	+									+	+							+	+	+
W19.	+	+									+	+							+	+	+
W20.	+	+									+	+							+	+	+
W 21.	+	+									+	+							+	+	+
W22.	+	+									+	+							+	+	+
W23.	+	+									+	+							+	+	+
W24.	+	+									+	+							+	+	+
W25.	+	+									+	+							+	+	+
U01	+												+	+					+	+	+
U02	+												+	+					+	+	+
U03	+												+	+					+	+	+
U04	+												+	+					+	+	+



#### 4.5. Criteria of assessment of the intended teaching outcomes

Form of classes	Grade	Criterion of assessment
lecture (L)	3	From 61%-68% correct test answers
	3,5	From 69%-76% correct test answers
	4	From 77%-84% correct test answers
	4,5	From 85%-92% correct test answers
	5	From 93% -100% correct test answers
classes (C)*	3	From 61%-68% learning programme content on the basic level, replies chaotic, leading questions necessary.
	3,5	From 69%-76% learning programme content on the basic level, answers systematized, requires assistance from the teacher.
	4	From 77%-84% learning programme content on the basic level, answers systematized, independent. Solving of problems in typical situations.
	4,5	From 85%-92% the scope of presented knowledge exceeds the basic level based on the supplementary literature provided. Solving of problems in new complex situations.
	5	From 93% -100% the scope of presented knowledge exceeds the basic level based on independently acquired scientific sources of information.
laboratories*	3	From 61%-68% learning programme content on the basic level, replies chaotic, leading questions necessary.
	3,5	From 69%-76% learning programme content on the basic level, answers systematized, requires assistance from the teacher.
	4	From 77%-84% learning programme content on the basic level, answers systematized, independent. Solving of problems in typical situations.
	4,5	From 85%-92% the scope of presented knowledge exceeds the basic level based on the supplementary literature provided. Solving of problems in new complex situations.
	5	From 93% -100% the scope of presented knowledge exceeds the basic level based on independently acquired scientific sources of information.

- **Thresholds are valid from 2018/ 2019 academic year**

#### 5. BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT

Category	Student's workload
	Full-time studies
<b>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</b>	<b>160</b>
<i>Participation in lectures*</i>	<b>50</b>
<i>Participation in classes, seminars, laboratories*</i>	<b>110</b>
<i>Preparation in the exam/ final test*</i>	
<i>Others*</i>	
<b>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</b>	<b>190</b>
<i>Preparation for the lecture*</i>	<b>20</b>
<i>Preparation for the classes, seminars, laboratories*</i>	<b>135</b>
<i>Preparation for the exam/test*</i>	<b>35</b>
<i>Gathering materials for the project/Internet query*</i>	
<i>Preparation of multimedia presentation</i>	
<i>Others*</i>	
<b>TOTAL NUMBER OF HOURS</b>	<b>350</b>
ECTS credits for the course of study	<b>14</b>

*Accepted for execution (date and signatures of the teachers running the course in the given academic year)*

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