**description of the course of study**

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| **Course code** | 0912-7LEK-B2.5-PzC |
| **Name of the course in** | Polish | **Fizjologia z cytofizjologią** |
| English | Physiology and cytophysiology |

1. **LOCATION OF THE course OF STUDY within the system of studies**

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| **1.1. Field of study** | medicine |
| **1.2. Mode of study** | Full-time  |
| **1.3. Level of study** | Uniform Master’s studies |
| **1.4. Profile of study\*** | General academic |
| **1.5. Person preparing the course description** | dr. hab. n. med., prof. UJK Anna Polewczyk |
| **1.6. Contact** | apolewczyk@ujk.edu.pl |

1. **General characteristicS of the course of study**

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| **2.1. Language of instruction** | English |
| **2.2. Prerequisites\*** | Anatomy, Histology |

1. **DETAILED CHARACTERISTICS OF THE COURSE OF STUDY**

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

1. **Objectives, syllabus CONTENT and intended teaching outcomes**

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| * 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:**1. Learn the basics of general human physiology including elementary aspects of cell physiology.
2. 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:**1. Assimilation of theoretical information about the functions of individual organs and systems.
2. 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. |

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| * 1. **Detailed syllabus *(including all forms of classes)***

**Interactive lectures with presentation of the clinical cases: 60 hours****I semester lectures - 30 hours**1.Cardiovascular system: 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. 4 h dr hab. prof. UJK Anna Polewczyk2.Physiological basis of electrocardiography 4 h dr hab. prof. UJK Anna Polewczyk3. Normal electrocardiogram 5 h dr hab. prof. UJK Anna Polewczyk4.**Myocardial contraction**. **Cardiac cycle. Regulation of heart activity 3 h e learning** dr hab. prof. UJK Anna Polewczyk 5**. Overview of the Circulation**; Biophysics of Pressure, Flow, and Resistance. Functions of the Arterial and Venous Systems. The Microcirculation and Lymphatic System. 2h **e learning** dr hab. prof. UJK Anna Polewczyk6. .The Nervous System: General Principles and Sensory Physiology. Organization of the Nervous System, Basic Functions of Synapses, and Neurotransmitters Sensory Receptors. 5h lek Michał Bączek7. The Nervous System: Muscle. Regulation of motor functions. 5 h lek Michał Bączek8. Exam I semester 2godz dr hab. prof. UJK Anna Polewczyk**II semester lectures - 30 hours**1. The Body Fluids and Kidneys. Water-mineral balance 5h lek Michalina Zagańczyk-Bączek2. **Hematology. Physiology of hematopoietic system. Red blood cells. White blood cells. 3h e learning** dr hab. prof. UJK Anna Polewczyk3. **Hematopoietic system. Platelets. Haemostasis 2h e learning** dr hab. prof. UJK Anna Polewczyk4. Sports Physiology. Adaptive physiology. 2h dr Maciej Polewczyk 5. Respiratory system. Mechanism of breathing. 3h dr Maciej Polewczyk6. Gastrointestinal Physiology. General Principles of Gastrointestinal Function: gastrointestinal motility. 3 h dr Maciej Polewczyk 7. Secretory functions of the digestive glands. Liver function 2 h dr Maciej Polewczyk8. Endocrinology and Reproduction. Introduction to Endocrinology. Pituitary Hormones and Their Control by the Hypothalamus. 4 h dr Iwona Pąłyga9. Thyroid Metabolic Hormones. Adrenocortical Hormones (pancreatic hormones) 4h dr Iwona Pąłyga10. Exam II semester 2h dr Maciej Polewczyk**Classes: 50 hours****I semester 25 hours Classes**1. Cardiovascular system Cardiac electrophysiology. Electrocardiography. 5h dr Maciej Polewczyk2. Systolic myocardial function.3 h dr Maciej Polewczyk3. Blood and body fluids circulation. Cardiovascular control Blood and body fluids circulation. Cardiovascular control. 3h dr Maciej Polewczyk4. Regulation of the circulation in the different organs and functional status of the organism 2 h dr Maciej Polewczyk5. Nervous system. Physiology of the nerve cell. Functional potential of the nerve cell. Conductivity in synapses and neuromuscular junction . 3h lek Michał Bączek6. Muscles. 3 h lek Michał Bączek7. Reflexes. The somatosensory feeling. The regulation of motor functions. 2 h lek Michał Baczek8. The autonomic nervous system. The organ of sight, hearing, balance, taste, smell. 2h Michał Bączek9. Exam including classes material in the field of cardiovascular system. 1 h dr Maciej Polewczyk 10. Exam including classes material in the field of nervous system 1 h lek Michał Bączek **II semester 25 hours Classes**1. Nephrology. The physiology of the kidney 3 h lek Michalina Zagańczyk-Bączek2. The acid-base and water-electrolyte balance 2 h lek Michalina Zagańczyk-Bączek3. Hematology. Blood components and the functions of the cellular elements. Blood groups. Haemostasis 3 h lek Emilia Grochowska4. Physical exertion 2 h dr Maciej Polewczyk5. Exam including classes material in the field of kidney and hematology 1 h lek Michalina Zagańczyk-Bączek, 1h lek Emilia Grochowska 6. Respiration. Function of respiratory system. 2 h dr Maciej Polewczyk7. Genesis of the respiratory rhythm and regulation of breathing 2h dr Maciej Polewczyk8. The digestive system. Motor action, digestion, absorption. The energy balance of the body 3 h dr Maciej Polewczyk9. The hormonal system: Hypothalamus. Hypophysis. Pancreas. Thyroid. Adrenal cortex. The adrenal medulla. Calcium homeostasis. Sex hormones. 4h dr Iwona Pałyga10. A written exam including classes material in the field of digestive system and hormonal system 2h dr Maciej Polewczyk**Laboratory : 60 hours****I semester 30 hours Laboratory** 1. Electrophysiology of the heart. ECG- practical aspects 6h dr Maciej Polewczyk2. Practical assessment of systolic function of the heart and hemodynamic cycle 6h dr Maciej Polewczyk3. Circulation of the blood and organ’s fluid 5h dr Maciej Polewczyk4. Practical aspect of physiology of the nerve cells. The assessment of the conductivity in the neuromuscular junctions. 5h lek Michał Bączek5. Muscles- examinations of sensation and reflexions- 4 h lek Michał Bączek 6. The autonomic nervous system- examination of vision and hearing 4h lek Michał Bączek**II semester 30 hours Laboratory** 1. Kidney. The acid-base and water-electrolyte balance- practical assessment 6h lek Michalina Zagańczyk-Bączek2. Blood components. Main functions of morphotic elements 5 h lek Emilia Grochowska3. Respiratory system- genesis of the rhythm of respiration 4h dr Maciej Polewczyk 4. Respiratory system- spirometry 3h dr Maciej Polewczyk5. Digestive system. Practical knowledge of the digestion mechanisms and gastrointestinal hormones 6h dr Maciej Polewczyk6. Hormonal system- diagnostic aspect. Reproductive system. 6 h dr Iwona Pałyga |

**4.3 Education outcomes in the discipline**

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| **Code** | **A student, who passed the course** | **Relation to teaching****outcomes** |
| within the scope of **knowledge**the graduate knows and understands : |
| **W 1** | basic cellular structures and their functional specifications; | A.W4. |
| **W 2** | the water and electrolyte balance in biological systems;  | B. W1 |
| **W 3** | acid-base homeostasis and mechanisms of buffers and their significance in systemic homeostasis; | B.W2. |
| **W 4** | the concepts of: solubility, osmotic pressure, isotonia, colloidal solutions and Gibbs-Donnan effect; | B.W3. |
| **W 5** | the physical, chemical and molecular basis of how the organs of the senses function;  | B.W7. |
| **W 6** | the metabolic profiles of basic organs and systems; | B.W16. |
| **W 7** | the influence of the oxidative stress on cells and its importance in the pathogenesis of diseases and in aging processes; | C.W47. |
| **W 8** | 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; | C.W49 |
| **W 9** | the consequences of inadequate nutrition, including long-term starvation, taking too large meals and the use of unbalanced diet as well as digestive disorders and malabsorption; | C.W50 |
| **W 10** | the consequences of vitamins or minerals deficiency and their excess in the body; | C.W48. |
| **W 11** | the processes such as: cell cycle, proliferation, differentiation, and cell aging, apoptosis and necrosis, and their importance for the functioning of the body; | B.W18. |
| **W 12** | basic problems concerning stem cells and their use in medicine;  | B.W19. |
| **W 13** | 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.W20. |
| **W 14** | 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 the dependence between them; | B.W21. |
| **W 15** | the mechanism of hormones’ functioning;  | C.W51. |
| **W 16** |  the reproductive function in women and men; | B.W22. |
| **W 17** |  the mechanisms of aging; | B.W23. |
| **W 18** | 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.W24. |
| **W 19** | the relationship between the factors that disrupt the equilibrium of biological processes and physiological and pathophysiological changes; | B.W25. |
| **W 20** | the genetics of blood groups and serological conflict in Rh system; | C.W6. |
| within the scope of **ABILITIES**the graduate knows how to**:** |
| **U1.** | operate the optical microscope, also making use of immersion, | A.U1. |
| **U2.** | describe 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. | C.U20.  |
| **U3.** | perform a simple function tests evaluating the human body as a system stable regulation (stress tests); interprets the figures on the basic physiological variables; | B.U7. |
| **U4.** | apply basic laboratory techniques, such as: qualitative analysis, titration, colorimetry, pehametry, chromatography, electrophoresis of proteins and nucleic acids; | B.U8. |
| **U5.** | operate simple measuring instruments and evaluates the accuracy of measurements; | B.U9. |
|  | within the scope of **SOCIAL COMPETENCE**, the graduateisable to: |  |
| K01 | establish and maintaindeep and respectfulcontact with the patient and show understandingtowardsideological and culturaldifferences;  | H.S1 |
| K02 | do whatisright for the patient; | H.S2 |
| K03 | respectmedicalconfidentiality and patient’srights; | H.S3 |
| K04 | takeactionsconcerning the patient on the basis of ethicalprinciples, beingaware of socialconditions and restrictionsresulting from illness; | H.S4 |
| K05 | recognizehis/herownlimitations and self-evaluateeducationaldeficiencies and needs; | H.S5 |
| K06 | promotehealthylifestyle; | H.S6 |
| K07 | usereliableinformationsources; | H.S7 |
| K08 | conclude on the basis of ownsurveys and observations; | H.S8 |
| K09 | introducerules of socialconduct and teamwork to the group of specialists, includingspecialists form othermedicalprofessionsalso in the multicultural and multinational environment; | H.S9 |
| K10 | giveopinionsconcerningvariousaspects of professionalactivity; | H.S10 |
| K11 | takeresponsibility for owndecisionsmadeduringprofessionalactivitiesincludingownsafety and safety of otherpeople; | H.S11 |

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| **Methods of assessment of the intended teaching outcomes** |
| **Teaching** **outcomes*****(code)*** | **Method of assessment (+/-)** |
| **Written exam -test\*** | **Test\*** | **Project\*Prezentation** | **Effort** **in class\*-discussion** | **Practical test\*** | **Group work\*** | **Others\*Attendance** | **Others****Observation** |
| ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** |
| *L* | *C* | *...* | *L* | *C* | *Lab* | *L* | *C* | *...* | *L* | *C* | *Lab.* | *L* | *C* | *Lab.* | *L* | *C* | *...* | *L* | *C* | *Lab* | *L/C/Lab* |
| 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 | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  | ***+*** | ***+*** |  |  |  | ***+*** | ***+*** | ***+*** |  |
| U05 | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  | ***+*** | ***+*** |  |  |  | ***+*** | ***+*** | ***+*** |  |
| K01K11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ***+*** |

***\*delete as appropriate***

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| * 1. **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**](https://pl.bab.la/slownik/angielski-polski/thresholds) **are valid from 2018/ 2019 academic year**
1. **BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT**

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| **Category** | **Student's workload** |
| **Full-time****studies** |
| *NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/* | **170** |
| *Participation in lectures\** | **50** |
| *Participation in classes, seminars, laboratories\** | **110** |
| *Preparation in the exam/ final test\** |  |
| *Others\** | **101** |
| *INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/* | **230** |
| *Preparation for the lecture\** | **60** |
| *Preparation for the classes, seminars, laboratories\** | **135** |
| *Preparation for the exam/test\** | **35** |
| *Gathering materials for the project/Internet query\** |  |
| *Preparation of multimedia presentation* |  |
| *Others\** |  |
| *TOTAL NUMBER OF HOURS* | **400** |
| ECTS credits for the course of study | **16** |

1 e-learning (withoutparticipation of the lecturer)

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

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