

**Course description (syllabus) form for higher education, doctoral,  
postgraduate and skills development programs**

**A. General course description**

<b>FIELD NAME</b>	<b>COMMENTS</b>
Course title (in Polish and English)	<b>Fizjologia</b> ( <i>Physiology</i> )
Unit organising the course	Department of Human Physiology Faculty of Medicine Collegium Medicum in Bydgoszcz Nicolaus Copernicus University in Torun
Unit for which the course is organised	Faculty of Pharmacy, Collegium Medicum, Nicolaus Copernicus University Field of study: Pharmacy Long-cycle master's studies
Course ID	1700-F2-FIZJ-J
ERASMUS code	0916
ECTS credit allocation	5
Method of passing	Exam
Language of instruction	English
Indication whether attempts at obtaining course credit can be repeated	No
Affiliation of the course to a course group	Science basics of medicine (Group B)
Total student workload	<p>1. Workload associated with demanding activities direct participation of academic teachers is:</p> <ul style="list-style-type: none"> <li>- participation in lectures: 30 hours</li> <li>- participation in exercises: 35 hours</li> <li>- conducting colloquiums: 4 hours</li> <li>- conducting the exam: 1 hour</li> </ul> <p>The workload related to classes requiring the direct participation of academic teachers is 70 hours, which corresponds to 2.8 ECTS points</p> <p>2. Balance of student workload:</p> <ul style="list-style-type: none"> <li>- participation in lectures: 30 hours</li> <li>- participation in exercises: 35 hours</li> <li>- preparation for exercises (including reading the indicated literature): 10 hours</li> <li>- preparing reports on exercises: 2 hours</li> <li>- preparation for and participation in colloquiums: 20+4=24 hours</li> <li>- preparation for the exam and participation in the exam: 25+1=26 hours</li> </ul>



	<p>The total student workload related to the course is 127 hours, which corresponds to 5.08 ECTS points</p> <p>3. Workload related to scientific research: - participation in lectures (taking into account research results and scientific studies): 2 hours</p> <p>The total student workload related to research is 2 hours, which corresponds to 0.08 ECTS points</p> <p>4. Time required to prepare for and participate in the assessment process: - preparation for exercises (including reading the indicated literature): 10 hours - preparation for and participation in colloquiums: 20+4=24 hours - preparation for the exam and participation in the exam: 25+1=26 hours</p> <p>The total student workload related to preparation and participation in the assessment process is 60 hours, which corresponds to 2.4 ECTS points</p> <p>5. Balance of the student's practical workload: - participation in laboratories: 30 hours - preparation for colloquiums (practical): 10 hours - preparation for exercises (practical): 10 hours</p> <p>The total student workload of a practical nature is 50 hours, which corresponds to 2.0 ECTS points</p> <p>6. The balance of student workload devoted to acquiring social competences in the field of exercises is: - preparation for laboratories: 5 hours</p> <p>The total student workload devoted to acquiring social competences in the field of laboratories is 5 hours, which corresponds to 0.2 ECTS points</p>
<p>Learning outcomes: knowledge</p>	<p>W1: Knows the correct structure of the following systems: circulatory, respiratory, digestive, circulatory, urinary, nervous and endocrine system of the human body and the basic relationships between the structure and function of the body in physiological conditions - K_A.W4</p> <p>W2: Knows the physiology of the following systems: nervous, endocrine, circulatory, lymphatic, reproductive, digestive, urinary, respiratory, adaptation mechanisms, nervous, hormonal and thermoregulatory regulation - K_A.W5</p> <p>W3: Knows and understands the mechanisms of modification of physiological processes occurring in the nervous system, internal secretion, circulation, reproductive, digestive, urinary and respiratory systems by selected pharmacological agents - K_A.W6</p> <p>W4: Knows the structure and functions of biological membranes, mechanisms of membrane transport and their role in the formation of resting and action potential in excitable cells and participation</p>



	<p>in the processes of changing the composition of urine and absorption of substances in the gastrointestinal tract - K_A.W10</p> <p>W5: Knows the molecular aspects of signal transduction in the nervous system, endocrine system, circulation, respiratory and digestive system - K_A.W11</p> <p>W6: Knows the mechanisms of metabolism regulation and the influence of selected drugs on these processes - K_A.W12</p> <p>W7: Knows the mechanisms of humoral and cellular immune response - K_A.W13</p> <p>W8: Knows the physical basis of physiological processes: circulation, nerve conduction, gas exchange, substance exchange - K_B.W1</p>
Learning outcomes: practical skills	<p>U1: Describes human adaptation mechanisms to various environmental conditions (high and low temperatures, diving, high altitudes) - K_A.U1</p> <p>U2: Describes physiological mechanisms and relationships between individual elements of the human body - K_A.U5</p> <p>U3: Uses the acquired knowledge to analyze the functional state of the body - K_A.U6</p>
Learning outcomes: social competence	<p>K1: Draws and formulates conclusions from own measurements and observations - K_B.K2</p> <p>K2: Has the ability to work in a team - K_B.K3</p>
Teaching methods	<p>Lectures:</p> <ul style="list-style-type: none"> <li>• problem lecture with multimedia presentation</li> <li>• informative lecture (conventional)</li> </ul> <p>Laboratory exercises:</p> <ul style="list-style-type: none"> <li>• laboratory</li> <li>• observations</li> <li>• classical problem-based exercise method</li> <li>• discussion</li> <li>• show</li> </ul>
Prerequisites	<p>A student starting education in the subject of Physiology should have basic knowledge of the anatomy and physiology of the circulatory system, respiratory system, nervous system, digestive system, internal secretion, reproductive system and the physiology of the kidney and blood at an advanced level and chemistry at an advanced level.</p>
Brief course description	<p>The "Physiology" course enables the student to learn basic concepts and understand the processes that regulate the functioning of individual organs and systems. It also allows you to understand the relationships between individual elements of the human body.</p>
Full course description	<p>The aim of the Physiology course is to familiarize students with the physiological processes and mechanisms responsible for the homeostasis of the human body. Lectures on Physiology are intended to present and consolidate knowledge of the basics of physiology: the circulatory system, respiratory system, endocrine system and nervous system. The student will become acquainted with the basic mechanisms of nerve cell functioning, will learn about the properties of the nerve cell's cell membrane and its role in the genesis of the resting potential and action potential as well as synaptic transmission. Then, he will become acquainted with the neurobiological basis of reflexes and the functioning of the movement control system. Additionally, you will gain knowledge</p>



	<p>about the functioning of the circulatory and respiratory systems and the mechanisms that regulate their work. The student will also learn about water and electrolyte management, kidney physiology and intrarenal regulation mechanisms. He will also learn about the physiology and regulation of digestive function. The exercises are laboratory in nature and are partially related to the issues discussed during lectures. The student will learn about the importance of the appropriate composition of extracellular fluid in the formation and transmission of information in the nervous system and the operation of chemical and electrical synapses. Then the student will learn the mechanism of skeletal muscle contraction, types of contraction and mechanisms regulating the force of contraction of these muscles. Additionally, during the exercises, the student will gain knowledge of the physiology of the hematopoietic system and basic blood laboratory parameters. The aim of the exercises is also to become familiar with ECG and blood pressure measurement, as well as functional changes occurring in the circulatory system as a result of changes in body position and under the influence of physical exercise. The student will also gain knowledge about the impact of environmental factors on the functioning of the respiratory system and the importance of spirometry in assessing the functioning of the respiratory system. You will also learn about body composition as well as neurohormonal weight control. Laboratory exercises in physiology allow you to develop individual and team work skills.</p>
Literature	<p>Basic literature:</p> <ol style="list-style-type: none"> <li>1. 1. The Textbook of Medical Physiology, . Guyton AC, Hall JE: Elsevier Saunders, 2021. 14th edition.</li> <li>2. Medical Physiology, Walter F. Boron, Emile L. Boulpaep, Elsevier Health Sciences, 2021.</li> </ol> <p>Additional literature:</p>
Assessment methods and criteria	<p>The basis for passing the Physiology subject is compliance with the principles set out in the Annex to the Teaching Regulations of the Department of Physiology.</p> <p>Laboratories:</p> <ol style="list-style-type: none"> <li>1) The condition for obtaining a pass in Physiology is passing all laboratories (passing reports/worksheets) and colloquiums.</li> <li>2) In the winter semester, 4 colloquia will be held for the field of Pharmacy:</li> </ol> <p>Colloquium No. 1, covering the thematic block: neurophysiology  Colloquium No. 2, covering thematic blocks: physiology of the circulatory system  Colloquium No. 3, covering thematic blocks: physiology of internal secretion</p>



	<p>Colloquium No. 4, covering thematic blocks: Physiology of the respiratory system and kidney physiology.</p> <p>4) Each colloquium consists of 30 questions, with 4 answer options, only one of which is correct. Each of them contains four possible answers - with 1 distractor and 3 distractors (no negative points for an incorrect answer). For each correct answer, the student receives 1 point. The condition for passing the test is to answer 18 questions correctly</p> <p>5) Grades are determined in accordance with the resolution of the Dean's Council No. 33/21 and in accordance with par. 17 section 2 of the study regulations of April 30, 2019.</p> <p>1) Students who have passed the winter semester take the exam  2) The final theoretical examination takes the form of a single-choice test consisting of 50 closed questions based on the knowledge acquired during lectures and laboratory exercises. Each of them contains four possible answers - with 1 distractor and 3 distractors (no negative points for an incorrect answer). The student receives 1 point for each correct answer. To pass the exam, you must answer 30 questions correctly.  3) Grades are determined in accordance with the resolution of the Dean's Council No. 33/21 and in accordance with par. 17 section 2 of the study regulations of April 30, 2019.</p> <p>Final theoretical exam: W1-W7, U1-U3, K1.  Written test: W1-W7, U1-U2, K1.  Written entry: W1-W7, U1-U2, K1.  Reports/worksheets: W1- W5, U1, K1.  Prolonged observation: K2.</p>
Work placement	Not applicable

### B1. Description of the subject of the series

FIELD NAME	COMMENTS
Period of instruction	2024/2025 - winter semester/ III semester
Form of assessment of course completion in the period of instruction	Exam
Form(s) of classes, number of hours and completion assessment methods	Lectures – 30 h: exam Tutorials – 35 h: ungraded credit
Name of course coordinator in the period of instruction	Prof. dr hab. Wojciech Kaźmierczak
Names of persons managing student groups for the course	prof. dr hab. n. med. Wojciech Kaźmierczak dr Wieńczysława Adameczyk mgr Monika Bejtka dr Mirosława Cieślicka dr Katarzyna Dmitruk dr Blanka Dwojaczny dr n. med. Łukasz Kluczyński dr n. med. Jerzy Kochan dr Monika Zawadka - Kunikowska dr Piotr Złomańczuk
Course attributes	<b>Obligatory</b>



Course groups including description and limit to the number of students within the groups	Lectures: all year round Exercises: groups of up to 12 people
Time and place of classes	The dates and places of classes are in accordance with the schedule published by the Dean's Office of the Faculty of Pharmacy
Learning outcomes defined for a given form of classes within the course	<p style="text-align: center;"><b>Lectures:</b></p> <p>W1: Describes the physiology of the nervous system and explains the mechanisms of transmission in the nervous system (K_A.W5)  W2: Characterizes thermoregulatory mechanisms (K_A.W5)  W3: Explains the physiology of the endocrine and reproductive systems and the mechanisms of hormonal regulation (K_A.W5)  W4: Explains the physiological mechanisms of the circulatory system, lymphatic system and respiratory system as well as the mechanisms of cardiopulmonary integration (K_A.W5)  W5: Describes the physiology of the digestive system and explains the mechanisms regulating food intake (K_A.W5)  W6: Describes the physiology of the urinary system (K_A.W5)  W7: Characterizes the mechanisms of modification of physiological processes within the nervous system, internal secretion, circulation, reproductive, digestive, urinary and respiratory systems by selected pharmacological agents (K_A.W6)  W8: Describes the course of hemostasis and explains the influence of selected pharmacological agents on its course (K_A.W6)  U1: Describes human adaptation mechanisms to various environmental conditions (high and low temperatures, diving, high altitudes) (K_A.U5)  U2: Describes physiological mechanisms and relationships between individual elements of the human body (K_A.U5)  U3: Uses acquired knowledge to analyze the functional state of the body (K_A.U6)</p> <p><b>Tutorials:</b></p> <p>W1: Describes the physiology of the nervous system and explains the mechanisms of transmission in the nervous system (K_A.W5)  W3: Explains the physiology of the endocrine and reproductive systems and the mechanisms of hormonal regulation (K_A.W5)  W4: Explains the physiological mechanisms of the circulatory system, lymphatic system and respiratory system as well as the mechanisms of cardiopulmonary integration (K_A.W5)  W5: Describes the physiology of the digestive system and explains the mechanisms regulating food intake (K_A.W5)  W6: Describes the physiology of the urinary system (K_A.W5)</p>



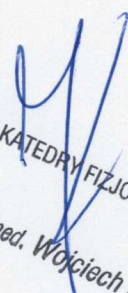
	<p>W7: Characterizes the mechanisms of modification of physiological processes within the nervous system, internal secretion, circulation, reproductive, digestive, urinary and respiratory systems by selected pharmacological agents (K_A.W6)</p> <p>U1: Describes human adaptation mechanisms to various environmental conditions (high and low temperatures, diving, high altitudes) (K_A.U5)</p> <p>U2: Describes physiological mechanisms and relationships between individual elements of the human body (K_A.U5)</p> <p>U3: Uses acquired knowledge to analyze the functional state of the body (K_A.U6)</p> <p>K1: Draws and formulates conclusions from own measurements and observations (K_B.K2)</p> <p>K2: Has the ability to work in a team (K_B.K3)</p>
<p>Methods and criteria for assessing a given form of classes within a subject</p>	<p>The basis for passing the Physiology subject is compliance with the principles set out in the Annex to the Teaching Regulations of the Department of Physiology.</p> <p>Laboratories:</p> <p>1) The condition for obtaining a pass in Physiology is passing all laboratories (passing reports/worksheets) and colloquiums.</p> <p>2) In the winter semester, 4 colloquia will be held for the field of Pharmacy:</p> <p>Colloquium No. 1, covering the thematic block: neurophysiology</p> <p>Colloquium No. 2, covering thematic blocks: physiology of the circulatory system</p> <p>Colloquium No. 3, covering thematic blocks: physiology of internal secretion</p> <p>Colloquium No. 4, covering thematic blocks: Physiology of the respiratory system and kidney physiology.</p> <p>4) Each colloquium consists of 30 questions, with 4 answer options, only one of which is correct. Each of them contains four possible answers - with 1 distractor and 3 distractors (no negative points for an incorrect answer). For each correct answer, the student receives 1 point. The condition for passing the test is to answer 18 questions correctly</p> <p>5) Grades are determined in accordance with the resolution of the Dean's Council No. 33/21 and in accordance with par. 17 section 2 of the study regulations of April 30, 2019.</p> <p>- Reports/worksheets: a condition for passing the report (no grade) is to obtain 60% of the maximum number of points.</p> <p>- Colloquia, entry tickets: entry tickets are required and colloquiums is to obtain 60% of the maximum number of points.</p> <p>Lectures:</p> <p>1) Students who have passed the winter semester take the exam</p> <p>2) The final theoretical examination takes the form of a single-choice test consisting of 50 closed questions based on the knowledge acquired during lectures and laboratory exercises. Each of them contains four possible answers - with 1 distractor</p>



	<p>and 3 distractors (no negative points for an incorrect answer). The student receives 1 point for each correct answer. To pass the exam, you must answer 30 questions correctly.</p> <p>3) Grades are determined in accordance with the resolution of the Dean's Council No. 33/21 and in accordance with par. 17 section 2 of the study regulations of April 30, 2019.</p> <p>Final theoretical exam: W1-W7, U1-U3, K1.  Written test: W1-W7, U1-U2, K1.  Written entry: W1-W7, U1-U2, K1.  Reports/worksheets: W1- W5, U1, K1.  Prolonged observation: K2.</p>
Course content	<p style="text-align: center;"><b>Lectures:</b></p> <ol style="list-style-type: none"> <li>1. Introduction to the subject of human physiology.</li> <li>2. Physiology of the organ of vision.</li> <li>3. Physiology of the urinary system.</li> <li>4. Physiology of kidney function.</li> <li>5. Physiology of the endocrine system</li> <li>6. Physiology of the hearing organ.</li> <li>7. Physiology of the balance system.</li> <li>8. Central nervous system</li> <li>9. Physiology of the urogenital system</li> <li>10. Physiology of the digestive tract</li> <li>11. Skin and appendages</li> <li>12. Basics of respiratory system physiology</li> <li>13. Physiology of the circulatory system.</li> <li>14. Summary – resume of lectures</li> <li>15. How to pass a test exam in human physiology.</li> </ol> <p style="text-align: center;"><b>Tutorials:</b></p> <ol style="list-style-type: none"> <li>1. Basics of cell electrophysiology - neuron structure, cell membrane structure, types of ion channels, ion pumps. Origin and features of the resting potential</li> <li>2. Origin and features of the action potential - excitability of the nerve cell, the role of ion channels, the phenomenon of refraction in the neuron (PhysioEx)</li> <li>3. Physiology of skeletal and smooth muscles - contraction mechanism and regulation of its force</li> <li>4. Electrical activity of the heart. The structure and role of the cardiac stimulus system. The influence of the autonomic system on the electrical activity of the heart.</li> <li>5. The effect of selected drugs on heart function. Case study</li> <li>6. Hemodynamic cycle, left ventricular volume-pressure curve. Systolic and diastolic blood pressure. Average arterial pressure. Orthostatic test. The role of baroreceptors in the regulation of blood pressure</li> <li>7. Regulation of internal secretion - hypothalamic-pituitary-thyroid axis. Thyroid hormones - receptors, mechanism of action at the cellular level, systemic effects</li> <li>8. Hormonal regulation of blood glucose concentration</li> <li>9. Blood composition, the role of morphotic elements, basic laboratory parameters</li> <li>10. Chemical and physical digestion process. Metabolism</li> <li>11. Respiratory system</li> </ol>



	12. Respiratory system 13. Glomerular filtration. Autoregulatory mechanisms in the kidney 14. Mechanisms responsible for changing the composition of urine, mechanism of action of selected diuretics 15. RKZ
Teaching methods	Identical to part A
Literature	Identical to part A

  
KIEROWNIK KATEDRY FIZJOLOGII CZŁOWIEKA  
prof. dr hab. n. med. Wojciech Kazmierczak