



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Human Physiology II	ZFIZ2115

Academic staff	Core academic unit(s)
Coordinating: Prof. Dr. Vaiva Hendrixson Other: Jun. Assist. Mantas Radzevičius; Lectr. Mykolas Udrys	Institute of Biomedical Sciences, Faculty of Medicine of Vilnius University. Department of Physiology, Biochemistry, Microbiology and Laboratory Medicine; M.K.Čiurlionio g. 21, Vilnius

Study cycle	Type of the course unit
Integrated studies	Compulsory

Mode of delivery	Semester or period when it is delivered	Language of instruction
Face-to-face, remote, blended (hybrid)	III semester	Lithuanian and English

Requisites	
Prerequisites: The student must have knowledge of general biology, morphology and biochemistry and an understanding of the structure of human cells, tissues, organs and organ systems, and of the biochemical processes occurring in the living organism	Co-requisites (if relevant):

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	134	67	67

Purpose of the course unit
The main objectives of this course are to learn about the functions of human organs and systems, including the processes of interaction between different physiological systems and the mechanisms of physiological regulations, in order to apply the fundamental theoretical knowledge in further clinical studies. Students should gain an overall understanding of the physiology of blood, and cardiovascular and respiratory systems. They should also be able to test some blood indices and measure and evaluate blood pressure and respiratory parameters during rest and physical activity under normal physiological conditions. After the course, students should be able to discuss, analyze and make conclusions regarding physiological processes taking place in the human body and to be able to apply the acquired knowledge, skills and attitudes in medical practice.

Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
<ul style="list-style-type: none"> • To be able to work independently and in teams, think critically be creative, take the initiative, and actively take part in discussions • To act honestly and according to ethical obligations, be emphatic 	<ul style="list-style-type: none"> • Lectures (including virtual and pre-recorded) • Seminars • Small groups discussions • Peer-to-peer teaching/learning (with 	<ul style="list-style-type: none"> • Formative assessment: feedback, reflection • Summative assessment: midterm examination (written quiz)

<ul style="list-style-type: none"> • To be able to work in diverse and multicultural environments and communicate appropriately with peers and educators • To demonstrate the capability to collaborate in intercultural environment, to manage time and resources effectively, to foster an inclusive and respectful work culture • To be able to explain the functions of blood, cardiovascular and respiratory systems, and to be able to discuss and make conclusions on various topics of human physiology • To be able to think critically, to analyse the interaction between various physiological mechanisms of the human body, and be able to integrate acquired knowledge and apply it in practice • To be able to independently perform particular blood indices testing tasks • To be able to measure arterial blood pressure and evaluate it at rest and during physical activity • To be able to measure and calculate the lung volumes and capacities using spirometer evaluate respiratory function under normal physiological conditions • To demonstrate ability to engage in peer-to-peer reflection and feedback • To be able to work with scientific literature and to use scientifically based biomedical evidence, including the latest knowledge in Human Physiology, and to present them to peers • To demonstrate knowledge and understanding of diverse communication models and techniques to effectively handle complex information, and to demonstrate the ability to use communication forms and techniques that are appropriate for the context • To demonstrate knowledge and understanding of learning skills and strategies required for self-directed learning 	<p>supervision and facilitation of the teacher)</p> <ul style="list-style-type: none"> • Flipped-classroom • Presentations • Computer simulations • Laboratory tasks • Feedback • Consultations • Independent work 	<ul style="list-style-type: none"> • Written final examination
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Content	Contact hours							Individual work: time and assignments	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	Contact hours, total	Individual work	Tasks for individual work
1. Functions of blood. Physical indices of blood: hematocrit, erythrocyte sedimentation rate (ESR), osmotic equilibrium, pH. Composition of blood plasma: plasma water, proteins, non-protein nitrogenous substances, electrolytes, lipids and lipoproteins, glucose, and control of its level.	4		4		8		16	10	To be prepared for the laboratory task “Determination of Hematocrit” Teamwork: according to the template prepare the presentation regarding the function of particular

									blood plasma component;
2. Functions of red blood cells, white blood cells, and platelets. Functions of haemoglobin. Haematopoiesis. Haemostasis. Anticoagulants. Blood types.	4				8		12	7	To be prepared for laboratory tasks “Determination of haemoglobin concentration in the blood” and “Determination of ABO and RhD blood types”.
3. Discussions on the topic of blood physiology.			3				3	7	According to outlines to be prepared for teamwork and PBL discussion on on blood physiology issues.
4. Midterm assessment (Written quiz): Blood Physiology.			1				1	7	According to outlines to be prepared for quiz on blood physiology issues
5. Feedback on the knowledge and understanding on the topic of blood and cardiovascular physiology			3				3		To reflect on the quiz
6. Functional characteristics of the heart. Stroke volume and cardiac output, and their changes during physical activity. Regulation of cardiac function.	2		4				6	7	To work on the computer simulation task “Influence of Various Factors on Heart Activity”. To do obligatory reading on <i>Interactive Physiology</i> , to complete exercises on <i>PhysioEx</i> , and according to outlines to be prepared for the discussion on the topic of heart physiology
7. Structural and functional properties of blood vessels. Blood flow and vascular resistance. Arterial blood pressure. Regulation of arterial pressure. Pulse. Microcirculation and the lymphatic system.	4				4		8	4	To be prepared for the seminar “Measuring of Blood Pressure” and “Investigation of the Influence of Physical Activity on the Functions of Cardiovascular System”. To learn to measure the arterial blood pressure using palpatory and auscultatory

									methods. To be prepared for discussions on the topic of vascular physiology.
8. Discussions on cardiovascular system physiology issues			3				3	7	According to outlines to be prepared for teamwork and PBL discussion on cardiovascular system physiology issues
9. Functions of respiratory system. Stages of respiration. Lung volumes and capacities. Mechanisms of inspiration and expiration. Gas exchange in the lungs and blood. Gas transport in the blood. Gas exchange in the lungs and tissues. Regulation of respiration.	2		3				5	4	To be prepared for the seminar "Spirometry". To learn how to measure and calculate the lung volumes and capacities using spirometer. To be prepared for the discussion on the topic of respiratory system physiology.
10. Discussions on respiratory system physiology issues.			3				3	7	According to outlines to be prepared for teamwork and PBL discussion on respiratory system physiology issues
11. Midterm assessment (Written quiz): Cardiovascular and Respiratory System Physiology.			1				1	7	According to outlines to be prepared for quiz on cardiovascular and respiratory physiology issues.
12. Feedback on the knowledge and understanding on the topic of cardiovascular and respiratory physiology			3				3		To reflect on the quiz
13. Finalization of outcomes of the entire course: remarks and conclusions			3				3		To reflect and to give final feedback of the course
Total	16		31		20		67	67	

Assessment strategy	Weight %	Deadline	Assessment criteria
Written quizzes (midterm tests) - the average grade of all four quizzes taken during the entire course	70%	3rd semester	<p>The student must be able:</p> <ul style="list-style-type: none"> To perform laboratory tasks, evaluate study data, summarize the information received and make conclusions. All the laboratory tasks should be completed.

			<ul style="list-style-type: none"> To be actively engaged in teamwork, to be able to apply theoretical knowledge in solving clinical cases (PBL); To be creative, to take initiative, to share the knowledge with classmates, to be actively involved in discussions and presentations, to think critically, and to be able to give a constructive opinion on issues of human physiology. To be able to work individually and in groups as a team member in culturally diverse groups. To be able to prepare a presentation and to clearly present it to the classmates To know how to use electronic library sources and to review, summarize and present scientific knowledge to classmates. To be able to determine hematocrit and hemoglobin concentration in blood; to determine ABO and RhD blood types, and to interpret the findings applying knowledge, understanding and skills in human physiology. <p>Two written quizzes (midterm tests) per semester are scheduled (four in total). Each quiz consists of 30 single-choice (SCQ), multiple-choice (MCQ), and/or short open questions. No more than 6 choices are given per question/task (SCQ, MCQ), and no more than 3 possible correct answers/choices in MCQ. 45 minutes is given to complete the quiz (1.5 minutes average to spend on one question) All four test (quiz) scores are cumulative and account for 70% of the final grade (at the end of the course).</p>
Written final examination	30%	The exam session	Final examination consists of 45 single-choice (SCQ), multiple-choice (MCQ), and/or short open questions. No more than 6 choices are given per question/task (SCQ, MCQ), and no more than 3 possible correct answers/choices in MCQ. 60 minutes is given to complete the examination (1.5 minutes average to spend on one question)
Final cumulative score/mark	100%	The exam session	The final evaluation of the course is cumulative: the final grade for Human Physiology consists of 70 % of the average grades of all the quizzes taken during the year, and 30 % of the score of the final examination. If the average grades of all the quizzes reaches 7-points, the minimum requirement of the course has been reached, and the score of the final exam can only improve the final grade but not lower it.

Author (-s)	Publishing year	Title	Issue of a periodical or volume of a publication	Publishing house or web link
Required reading				
Hall, John E.; Guyton, Arthur C.	2011	Guyton and Hall Textbook of medical physiology, 12 th ed.	12 th edition	Philadelphia, Elsevier Saunders
MasteringA&P for Silverthorn: Human Physiology 8e	2019		8 th edition	Pearson Education
https://www.interactivephysiology.com/login/index.html				
Recommended reading				

Mann, Jake P. Marples, David	2015	Physiology: core science and clinical cases in one book		Eureka, JP Medical Ltd, London
Silbernagl S, Despopoulos A.	2009	Color Atlas of Physiology		Thieme, Stuttgart
https://www.clinicalkey.com/#/				
https://www.clinicalkey.com/student/login?target=%2Fstudent				
http://accessmedicine.mhmedical.com/				