

<i>Name of the course</i>	Physiology			Code	
<i>Type of study program Cycle</i>	Integrated study program, medicine			Year of study	II
<i>Credits (ECTS):</i>	18.0	<i>Semester</i>	IV	Number of hours per semester (1+e+s)	180 (65+45+70)
<i>Status of the course:</i>	mandatory	<i>Preconditions:</i>	Successfully passed first year exams	<i>Comparative conditions:</i>	/
<i>Access to course:</i>	2 nd year medical students			<i>Hours of instructions:</i>	According to schedule
<i>Course teacher:</i>	Associate Professor Danijel Pravdić, MD, PhD				
<i>Consultations:</i>	Arranged if needed in agreement with students (during and after the course)				
<i>E-mail address and phone number:</i>	danijel.pravdic@sve-mo.ba				
<i>Associate teachers</i>	Domestic teachers: Associate Professor Ivan Ćavar, MD, PhD Ante Bogut, MD Antonio Markotić, MD Visiting teachers: Full Professor Zlatko Trobonjača, MD, PhD (Faculty of Medicine, Rijeka) Assistant Professor Tomislav Kelava, MD, PhD (School of Medicine, Zagreb)				
<i>Consultations:</i>	-				
<i>E-mail address and phone number:</i>	-				
<i>The aims of the course:</i>	The overall aim of the Physiology course is to increase understanding of the normal functions of the human body.				
<i>Learning outcomes (general and specific competences):</i>	<u>General outcomes:</u> <ul style="list-style-type: none"> Applying independent learning throughout the course in the way of critical and self-critical questioning and evaluation of scientific facts. Applying personal knowledge and skills to provide personal contribution to teamwork (showing genuine interest through active listening and building of positive relationships within group). <u>Specific outcomes:</u> <ul style="list-style-type: none"> Understanding the normal function of the living organism, based on the fundamental knowledge previously acquired during other basic medical courses (biology, chemistry, anatomy). 				

	<ul style="list-style-type: none"> • Understanding of the fundamental mechanisms, starting with molecular, through cellular to the organ level. • Synthesis of processes at the level of the whole organism. <p>Outcomes will be evaluated through continuous assessment (weekly written test), active forms of learning during lectures and seminars and on final exam (written test and oral exam).</p>			
<p>Course content (Syllabus):</p>	<p>The Physiology course comprises 180 hours over an 11 weeks' period, which includes the after-course exam periods. The course is divided into two approximately equal parts: Physiology I (Ph1) and Physiology II (Ph2). Each course part lasts for 3 weeks, followed by a one week of exam period for taking partial written exams (PE). If attendance criteria are met and both of PE passed, students can take oral exam.</p> <p>Each part of the course (Ph1 and Ph2) consists out of lectures, seminars and exercises (practical work). At the end of every week or after one course unit is finished, integration seminar is held. These integration seminars allow one to repeat and fortify acquired knowledge through problem solving or questions-and-answers types of seminars. Their purpose is to motivate students to learn from the very beginning of the course and to stimulate them to discuss and determine the key facts of the previously covered subject matter. Activity of the students and their knowledge is assessed throughout seminars and practical work, especially in integration seminars.</p>			
<p>Format of instruction (mark in bold)</p>	<p>Lectures</p>	<p>Exercises (practical work)</p>	<p>Seminars</p>	<p>Independent assignments</p>
	<p>Consultations</p>	<p>Work with mentor</p>	<p>Field work</p>	<p>Other</p>
	<p>Remarks: Every unit starts with lectures, followed by seminars and practical work. Seminars are held in small groups which enables better interaction between teacher and students. Students will be introduced to practical work on exercises. Students will take part in performing specific practical assignments with the help of assistants or through independent work, when applicable.</p>			
<p>Student responsibilities</p>	<p>Partial exams; weekly tests; practical assignments; attending and active participating in the course.</p> <p>Students will be evaluated based on:</p> <ul style="list-style-type: none"> • Active participation in seminars and practical activities; • Preparation of units for seminars; • Development of their own critical thinking about the material they have read and ability to express their opinions. 			

Screening student work <i>(mark in bold)</i>	Class attendance	Class participations	Seminar essay	Practical training
	Oral exam	Written exam	Continuous assessment	Essay

Detailed evaluation within a *European system of points*

STUDENTS RESPONSIBILITIES	HOURS	PROPORTIONS OF ECTS CREDITS	PROPORTION S OF MARK
Class attendance and participations	60	2.0	0%
Seminar essay	15	0.5	0%
Written exam	240	8.0	50%
Oral exam	210	7.0	50%
Practical training	20	0.5	0%

Further clarification:

Weekly (written) tests are held at the beginning of every week. There are six weekly tests that consists out of 20 questions related to the lessons from previous week. These tests are evaluated according to the following scheme:

grade A = 2 bonus points

grade B = 1.5 bonus points

grade C = 1 bonus point

grade D = 0.5 bonus point

grade F = 0 bonus point.

Only passed test are considered, so there are no negative points. Weekly tests are obligatory for all students. Students who skipped a single weekly written test lose their right of bonus points in corresponding course part. Maximum number of bonus points that student can earn on each partial exam is six (6). Thus, in practice, bonus points allow students to increase their grade by one level (e.g. from C to B). Negative points will be assigned to students who disturb classes or show lack of motivation and interest.

The partial (written) exam takes place one week after each part of the course (so called after-course exam period). It consists of 80 multiple choice questions with only one correct answer out of five given. To pass the partial exam, students need to achieve the score of 55% or more (i.e. at least 44 points, which is elimination threshold). Students who achieved at least two bonus points can lower the elimination threshold by two points, i.e. from 44 to 42 points. Bonus points are added to the score achieved on test if student surpass the elimination threshold, thus allowing student to reach higher grade. Maximum number of bonus points that can be added to test score is 6 for each partial exam.

Passed partial exam from first part of the course (Ph1) is NOT the precondition for taking second partial exam (Ph2). Taking partial exams in the after-course exam period does NOT count as taking exam. Student apply on each partial exam at their study consultant.

The oral exam covers the most important, integrative parts of physiology. List of integrative parts/questions is announced at the beginning of the course (Rules for undergraduate study

program (Art. 67 and Art. 68)). The purpose of oral exam is to examine integrative knowledge which is essential for understanding of the Physiology course in its entirety, understanding of other courses and further medical practice.

To qualify for oral exam, student must pass both partial exams and the colloquium of exercises (practical work). Students who passed partial exams during course can apply for oral exam directly in exam period, which does count as taking final exam. Students can apply for final exam using University Information System (ISS). Whole exam must be completed within seven days.

There will be two terms to take **final exam** in both, summer and autumn exam periods, with the interval of at least 14 days between two terms. Students who passed one partial exam take only the partial exam which they didn't pass (i.e. previously passed partial exam is acknowledged). Bonus points are not added to the test score in final exams, so student must score at least 55% to pass the partial exam. Whenever student takes final exam in these exam periods, it is counted as one taking of the exam. Students who pass one part of exam, but not overall exam, "carry" the passing grade they achieved to another final exam(s).

According to the regulations of the study, final grade is obtained:

- A = 91-100% 5
- B = 79 to 90% 4
- C = 67 to 78% 3
- D = 55 to 66% 2
- F = 0 to 54% 1

Students who find that they undeservedly received negative or lower grade may within 24 hours write a complaint to request new final exam in front of the committee or to request taking exam in the next exam period (Rules for study programs of University of Mostar, Art. 58.).

Required literature:	<ul style="list-style-type: none"> • Guyton AC, Hall JE: Textbook Of Medical Physiology, 13th Edition, 2016. • Physiology: Practical Work Tutorials, internal edition, School of Medicine, Mostar, 2015.
Optional literature:	<ul style="list-style-type: none"> • Linda S. Costanzo Physiology: Board Review Series, 2nd edition, Lippincott, Williams & Wilkins. • Linda S. Costanzo: Physiology, 4th edition, Saunders Elsevier, 2010.
Additional information about the course	<p>Means of quality assessment of the course:</p> <ul style="list-style-type: none"> - student questionnaire - quality analysis by students and teachers - analysis of the exam pass rates - report of the Teaching Quality Office - self-evaluation and extraneous evaluation (visits of quality assessment teams)

Annexes: calendar classes

<i>The number of teaching units</i>	TOPICS AND LITERATURE
Lectures:	<p>L1: Functional organization of human body and homeostasis; transport of ions and molecules through cell membranes</p> <p>L2: Basic physics of membrane potentials</p> <p>L3: Excitation of skeletal muscle</p> <p>L4: Excitation and contraction of smooth muscle</p> <p>L5: Physiology of cardiac muscle</p> <p>L6: Rhythmical excitation of the heart</p> <p>L7: The normal ECG</p> <p>L8: Overview of the circulation: physics of pressure, flow and resistance</p> <p>L9: Long-term control of arterial pressure: integrated system for arterial pressure regulation</p> <p>L10: Hemorrhagic shock and physiological principles of treatment</p> <p>L11: The body fluid compartments and volumes and their balance; edema</p> <p>L12: Kidneys: physiological anatomy and function</p> <p>L13: Thirst, integration of renal mechanisms for control of blood volume and extracellular fluid volume</p> <p>L14: Regulation of renal potassium, calcium and magnesium excretion</p> <p>L15: Micturition and diuretics</p> <p>L16: Regulation of acid-base balance: acids, bases, pH, buffers</p> <p>L17: Erythrocytes</p> <p>L18: Resistance of the body to infection</p> <p>L19: Hemostasis and blood coagulation</p> <p>L20: Mechanics of lungs, Laplace's law, functions of the respiratory passageways</p> <p>L21: Pulmonary circulation, pulmonary edema and pleural fluid</p> <p>L22: Physical principles of gas exchange</p> <p>L23: Physiologic problems of high-altitude and deep-sea diving</p> <p>L24: The autonomic nervous system and the adrenal medulla</p> <p>L25: General principles of gastrointestinal function</p> <p>L26: Review and regulation of carbohydrate metabolism, formation of ATP</p> <p>L27: Review and regulation of lipid metabolism</p> <p>L28: Review and regulation of protein metabolism</p> <p>L29: The liver as an organ, iron metabolism</p> <p>L30: Dietary balance, regulation of feeding, obesity and starvation, vitamin and minerals</p> <p>L31: Body temperature regulation</p> <p>L32: Introduction to endocrinology; principles of secretion, transport, action and clearance of hormones</p> <p>L33: Pituitary gland-hypothalamus relation, posterior pituitary hormones</p> <p>L34: Blood glucose regulation, diabetes mellitus</p>

	<p>L35: Calcium and phosphate metabolism, Bone and teeth physiology L36: Synthesis of adrenocortical hormones, functions of mineralocorticoids L37: Spermatogenesis, male fertility L38: Monthly ovarian cycle and function of the gonadotropic hormones L39: Puberty, menarche, menopause and female fertility L40: Pregnancy and parturition L41: Lactation and fetal physiology</p> <p>Literature: required and optional</p>
Seminars:	<p>S1: Membrane and action potentials S2: Contraction of skeletal muscle S3: Cardiac cycle, regulation of heart pumping S4: Integration (general physiology, potentials, muscles and heart) S5: Vascular distensibility, functions of the arterial and venous systems, the structure of microcirculation S6: Capillary fluid exchange, local control of tissue blood flow S7: Humoral and nervous regulation of circulation, rapid control of arterial pressure S8: Cardiac output and venous return S9: Muscle blood flow and coronary circulation S10: Integration (circulation) S11: Glomerular filtration, renal blood flow and their control S12: Tubular reabsorption and secretion S13: Regulation of reabsorption in tubules, renal clearance S14: Regulation of extracellular fluid osmolarity and sodium concentration S15: Acid-base regulation: respiratory and renal regulation, acidosis and alkalosis S16: Integration (kidneys and body fluids) S17: Pulmonary ventilation S18: Composition of alveolar air and diffusion of gases through the respiratory membrane S19: Transport of oxygen and carbon dioxide in blood and tissue fluids S20: Regulation of respiration S21: Integration (respiratory system) S22: Propulsion and mixing of food in the alimentary tract S23: Secretory functions of the alimentary tract I S24: Secretory functions of the alimentary tract II; absorption of water and ions S25: Energetics and metabolic rate S26: Integration (alimentary tract and metabolism) S27: Anterior pituitary hormones S28: Thyroid hormones S29: Insulin and glucagon S30: Parathyroid hormone, calcitonin, vitamin D S31: Adrenocortical hormones</p>

	<p>S32: Integration (endocrinology) S33: Male sex hormones, pineal gland S34: Ovarian hormones and female monthly rhythm S35: Integration (reproduction)</p> <p>Literature: required and optional</p>
<p><i>Exercises – Practical work:</i></p>	<p>E1: <i>Prosig</i>: Transport of molecules and ions through cell membrane, membrane potentials E2: <i>Interactive physiology 9.0</i>: Contraction of skeletal and smooth muscle E3: Regulation of heart pumping E4: Recording and the analysis of ECG, E5: Vectorial analysis of ECG E6: Measuring of the arterial pressure and peripheral pulse rate, heart sounds E7: Effect of exercise and different body positions on arterial pressure E8: <i>Interactive physiology 9.0</i>: Cardiovascular system E9: Electrocardiogram and cardiac cycle (Wiggers diagram) E10: <i>Interactive physiology 9.0</i>: Analysis of renal function E11: Acid-base regulation E12: Hematology I (erythrocyte count, hemoglobin and hematocrit) E13: Hematology II (hematological indices, determination of blood type) E14: <i>Interactive physiology 9.0</i>: Respiratory system E15: Spirometry test I E16: Spirometry test II E17: Oxygen-hemoglobin dissociation curve, carbon dioxide dissociation curve E18: Astrand cycle ergometer test E19: Physical and chemical processes of digestion E20: OGTT- Oral Glucose Tolerance Test E21: Endocrinology I E22: Endocrinology II</p> <p>Literature: required and optional</p>