

MFSE SECOND YEAR

SECOND YEAR

THIRD SEMESTER (WINTER)						
Code	Course Title	L	P	S	TCH	ECTS
MFSE 0301	Human Physiology 1	39	45	16	100	10
MFSE 0302	Medical Biochemistry 2	47	33		80	7
MFSE 0303	Histology 1	39	31		70	6
MFSE 0304	Neurophysiology	18	30	12	60	4
MFSE 0305	Bosnian Language 3	15	15		30	2
MFSE 0306 - 0307	Elective Course 1	10	10		20	1
	TOTAL	168	164	28	360	30

Elective Courses:

MFSE 0306 Medical Cytogenetic

MFSE 0307 Fundamentals of Human Nutrition

Code: MFSE 0301		Course title: HUMAN PHYSIOLOGY 1	
Level: preclinical	Study year: II	Semester: III	ECTS: 10
Status: obligatory	Total contact hours: 100		
Prerequisites:	According to the study regulations		
Lecturers: Assistant Professor Amina Valjevac MD PhD, MD PhD, Professor Asija Zaćiragić MD PhD, Assistant Professor Amela Dervišević MD PhD, Assistant Professor Orhan Lepara MD PhD,			
1. Overall aim	The overall aim of the Human Physiology 1 Course is to increase understanding of the fundamental mechanisms of cellular and organ systems functioning and its regulations under normal physiological conditions.		
2. Course contents	The following topics will be covered within the Modules: Module 1. Introduction to human physiology Module 2. Cell membrane physiology Module 3. Excitable tissues physiology Module 4. Cardiovascular physiology 4.1. Heart 4.2. Circulation Module 5. Respiratory physiology		
3. Learning outcome (knowledge, skills and competences)	<p>Students will acquire knowledge necessary to understand the normal functioning of the body, which is basis for further successful following of medical program and their future independent work.</p> <p>They will be able to understand human body functioning mechanisms, starting from molecular through cellular to organ level. Finally, all processes will be integrated at the level of the entire organism.</p> <p>Students will be able to independently solve problems which requires active participation.</p> <p>Through practical work the students will understand the task of integrating the acquired knowledge and using skills of classical physiological laboratory experiments.</p> <p><i>Through the lectures and seminar, the students will gain following knowledge and competences:</i></p> <ol style="list-style-type: none">1. Discover the basics of human body functional organization and principles of homeostatic mechanisms.2. Learn functional properties of biological membranes, cell membrane transports and principles of ion channels functioning.3. Understand how the bioelectric potentials of excitable tissues (nerve and muscle) occur and can be registered.4. Learn the functional organization of the cardiovascular system and its physiological roles.5. Learn the functional properties of the heart muscle and valves, bioelectrical activity, heart rate regulation, pressure and volume changes during the cardiac cycle. Student will learn principles of electrocardiogram registration, analysis and interpretation.6. Learn the functional aspects and physiological roles of different blood vessels, relation between pressure, flow and resistance in the circulatory system, the mechanisms underlying regulation of cardiac output, resistance and arterial blood pressure.7. Discover the physical properties of gases, ventilation and its regulation, gas exchange and transport.		

	<p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> - Interpretation of resting and action potential - Interpretation of myograms after different stimulation frequency - Interpretation of electromyography - Interpretation of pneumogram - Registration and analysis of ECG - Determination of the heart's electrical axis - Analysis of carotid artery pulse pressure curve - Analysis of polycardiogram - Analysis of phonocardiogram - Auscultation of the heart sounds - Measurement of peripheral pulse - Measurement of blood pressure - Interpretation of static and dynamic spirometry - Analysis of spirogram
4. Teaching methods	<p>Lectures: 39 hours Seminars: 16 hours Laboratory practical work: 45 hours</p>
5. Method of knowledge assessment and examination	<ul style="list-style-type: none"> - Written tests in the form of Multiple choice questions (MCQ) tests and - Oral examination <p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical laboratory colloquium.</p>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> – Hall J E. Guyton and Hall Textbook of Medical Physiology. 12th edition. Elsevier Saunders; 2010. <p>Additional:</p> <ul style="list-style-type: none"> – Boron and Boulpaep. Medical Physiology. 2nd edition. Saunders Elsevier; 2009.
7 Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: fiziologija@mf.unsa.ba</p>

COURSE PLAN: HUMAN PHYSIOLOGY 1

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<p>Lecture: Functional organization of the human body and control of the “internal environment”, -the cell and its functions,</p> <p>Lecture: Ion channels, transport of substances through the cell membrane</p> <p>Practical laboratory work: Cell membrane and transport through membrane, ion channels</p>	<p>1</p> <p>2</p> <p>3</p>
Week 2.	<p>Lecture: Resting membrane potential</p> <p>Lecture: Stimuli, Action potential, Methods of action potential registration</p> <p>Practical laboratory work: Action potential, resting potential</p>	<p>1</p> <p>2</p> <p>3</p>
Week 3.	<p>Lecture: Physiologic anatomy of skeletal muscle, excitation of skeletal muscle: neuromuscular transmission</p> <p>Lecture: Contraction of skeletal muscle</p> <p>Practical laboratory work: Neuromuscular junction, contraction of skeletal muscle, muscle twitch</p>	<p>2</p> <p>2</p> <p>3</p>
Week 4.	<p>Seminar: Energetics of muscle contraction, characteristics of whole muscle contraction</p> <p>Lecture: Contraction and excitation of smooth muscle</p> <p>Practical laboratory work: Summation of contraction; tetanic contraction, maximum strength of contraction, electromyography (BIOPAC)</p>	<p>2</p> <p>2</p> <p>3</p>
Week 5.	<p>Seminar: Partial exam 1</p> <p>Lecture: Heart muscle, the heart as a pump and function of the heart valves, cardiac cycle</p> <p>Practical laboratory work: Colloquium 1, Heart function (CD presentation, A.D.A.M., Interactive Phys lab)</p>	<p>1</p> <p>2</p> <p>3</p>
Week 6.	<p>Lecture: Rhythmical excitation of the heart</p> <p>Lecture: The normal electrocardiogram and principles of vectorial analysis</p>	<p>2</p> <p>2</p>

	Practical laboratory work: Electrocardiography (ECG) - registration and analysis	3
Week 7.	Seminar: Regulation of heart pumping Lecture: Overview of the circulation; medical physics of pressure, flow, and resistance Practical laboratory work: Auscultation of heart sounds, registration and analysis of phonocardiogram	2 2 3
Week 8.	Lecture: Vascular distensibility and functions of the arterial and venous systems Lecture: The microcirculation and the lymphatic system, capillary fluid exchange, interstitial fluid and lymph flow Practical laboratory work: Characteristics of the arterial pulse Arterial pulse examination, Analysis of sphygmogram	2 2 3
Week 9.	Seminar: Local and humoral control of blood flow by the tissues Lecture: Arterial pressure Practical laboratory work: Cardiac efficiency tests, demonstration of carotid sinus reflex, polycardiography, analysis of polycardiogram	2 1 3
Week 10.	Lecture: Nervous regulation of the circulation, and rapid control of arterial pressure Lecture: Role of the kidney in long-term regulation of arterial pressure Practical laboratory work: Problem based learning- Cardiovascular system	2 2 3
Week 11.	Seminar: The integrated system for pressure control Lecture: Cardiac output, venous return, and their regulation Practical laboratory work: Blood pressure regulation, measurement of blood pressure	1 2 3
Week 12.	Lecture: Muscle blood flow and cardiac output during exercise; the coronary circulation Seminar: Physiological responses to alterations in cardiovascular functioning Practical laboratory work: Factors that affect blood pressure effect of posture, gravity and muscular exercise on blood pressure and heart	2 2 3

	rate	
Week 13.	Seminar: Partial exam 2 Lecture: Pulmonary ventilation Practical laboratory work: - Colloquium 2; Pulmonary ventilation (CD presentation, A.D.A.M., Interactive Phys lab); Spirometry (BIOPAC); Spirogram - analysis and interpretation	2 2 3
Week 14.	Lecture: Physical Principles of Gas Exchange; Diffusion of Oxygen and Carbon Dioxide Through the Respiratory Membrane Lecture: Pulmonary Circulation, Transport of Oxygen and Carbon Dioxide in Blood and Tissue Fluids Practical laboratory work: Pneumography; Gas exchange; Regulation of breathing (CD presentation, A.D.A.M., Interactive Phys lab)	2 2 3
Week 15.	Seminar: Regulation of respiration Seminar: Partial exam 3 Practical laboratory work: Colloquium 3	2 2 3
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September make-up exam)	

Code: MFSE 0302	Course title: MEDICAL BIOCHEMISTRY 2		
Level: preclinical	Study year: II	Semester: III	ECTS:7
Status: obligatory	Total contact hours: 80		
Prerequisites:	According to the study regulation		
Lecturers: Associate Professor Sabaheta Hasić MD PhD, Associate Professor Radivoj Jadrić MD PhD, Associate Professor Emina Kiseljaković MD PhD, Assistant Lejla Alić MD, Assistant Armin Kulo MD			
1. Course aims	Aims of the Medical Biochemistry 2 Course are to acquire: <ul style="list-style-type: none">– knowledge and understanding of metabolic pathways in human organism, their energetic aspects and regulation– metabolic and biochemical characteristics of tissues, organs and body fluids– knowledge of basic analytical procedures in determination of body fluids constituents and their application in screening and diagnostics.		
2. Course contents	<p>The following topics will be covered within the Modules:</p> <p>Module 1. Carbohydrate metabolism Aim: To acquire knowledge of energetic and intermediary metabolism of carbohydrates</p> <p>Module 2. Lipid metabolism Aim: To acquire knowledge of energetic and intermediary metabolism of lipids</p> <p>Module 3. Amino acids and protein metabolism Aim: To acquire knowledge of metabolic pathways of amino acids, proteins, non-protein nitrogen derivatives, their storage and energetic values</p> <p>Module 4. Biochemistry of hormones, interaction of intermediary metabolism Aim: To acquire knowledge of hormone biochemistry and basics of metabolic regulation mechanisms</p> <p>Module 5. Metabolic and biochemical specificities of body fluids, tissues and organs Aim: To acquire knowledge of specificities of organs and tissues metabolism, their interaction and composition of body fluids in healthy individuals.</p>		
3. Learning outcomes (Knowledge, skills and competences)	<p><i>Through the lectures the students will gain following knowledge and competences:</i></p> <ul style="list-style-type: none">– Understand biochemical mechanisms of the occurrence of various diseases through knowledge of metabolic processes, metabolic specificities of tissues and organs, complexity of regulation, importance of cooperation between tissues and organs– Determine the composition of body fluids constituents and their importance in differentiation of pathological conditions from physiological.		

	<p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none">– Photometric measurement of different compounds. Construction of a calibration curve– Analysis of body fluids constituents– Usage of laboratory equipment												
4. Teaching methods	<p>Lectures: 47 hours</p> <p>Laboratory practical work: 33 hours</p>												
5. Method of knowledge assessment and examination	<p>Continuous assessment of knowledge (Midterm examination) will be carried out through practical exams (colloquiums) and partial exams.</p> <p>During any form of knowledge assessment, the student will attain certain number of points with an obligatory minimum of 55% to pass the test successfully.</p> <p>Practical exam (colloquium)</p> <p>Laboratory practical work is based on the principle of interactive learning, where the student is obliged to prepare the lectures in advance. Continuous knowledge assessment will be carried out with five colloquiums. Each colloquium consists of 9 MCQ, where 5 correctly answered questions are considered as 55% of correct answers. Maximal score attained in each colloquium is 8,4 and minimum 4,6.</p> <p>Partial exam</p> <p>Topics contained in five modules will be assessed through two partial exams in the form of test. Each test consists of 50 MCQs. Minimum correctly answered questions needed to pass the test (55%) is 27. First partial exam will be held in ninth week of the semester and will be consisted of modules 1., 2., and 3. Second partial exam will be held in fifteenth week of the semester and will be consisted of modules 4. and 5.</p> <p>Points attained during continuous knowledge assessment in partial exams are:</p> <table><tr><td>Points attained through partial exams</td><td>min</td><td>max</td></tr><tr><td>Test 1 – Partial exam 1</td><td>16</td><td>29</td></tr><tr><td>Test 2 – Partial exam 2</td><td>16</td><td>29</td></tr><tr><td>Total</td><td>32</td><td>58</td></tr></table>	Points attained through partial exams	min	max	Test 1 – Partial exam 1	16	29	Test 2 – Partial exam 2	16	29	Total	32	58
Points attained through partial exams	min	max											
Test 1 – Partial exam 1	16	29											
Test 2 – Partial exam 2	16	29											
Total	32	58											

Students who have successfully accomplished all of their obligations during the semester (attendance is within the legal limits) and who have passed all the necessary exams of the course (attained minimum score of 55% in partial exams 1 and 2 and all five colloquiums) are not required to take Regular exam. Their final grade is reported according to points attained during Continuous knowledge assessment.

Total points attained during Continuous knowledge assessment in both Practical and Partial exams:

Total points	min	max
Practical exam	23	42
Test 1+2	32	58
Total	55	100

Regular examination term

Student is obliged to take regular exam if minimum points are not attained during midterm exams for both practical and theoretical parts of the course. Regular exam should be taken also if a student is not satisfied with the grade received on the midterm examination. Practical work will be taken before theoretical examination as obligatory condition for theoretical examination. The student draws a card with one question from the topics of the colloquium that was failed (one card per colloquium). The parts are evaluated as follows:

1. Student describes the assigned topic – 1 point
2. Student describes the significance of the assigned topic – 2 points
3. Student describes appliances, accessories and reagents needed to carry out the reaction – 0,6 points
4. Students describes analytical procedure – 2 points
5. Student is able to perform practical work – 2 points
6. Students is able to interpret the results and reference range – 0,8 points

Minimum points needed to pass the practical exam is 4,6 points per topic. Student who did not meet the minimum criteria for Partial exams during Midterm examination is obliged to take Regular exam. Previously defined criteria for Midterm examination apply to Regular exam as following:

	Points attained	min	max
	Test 1	16	29
	Test 2	16	29
	Total	32	58
In order to pass the course, it is necessary to attain following sum of points:			
	Total points	min	max
	Practical exam	23	42
	Test 1+2	32	58
	Total	55	100
<p>Re-sit examination term /September examination term</p> <p>Previously defined criteria will be applied also in Re-sit and September examination terms.</p> <p>Grading system and grading points</p> <p>Final grade is reported according to points attained during both forms of the knowledge assessment (practical and theoretical exams).</p>			
	Grade	Total score (points)	Grade description
	10 (A)	95-100	Outstanding results without errors or with minor errors
	9 (B)	85-94	Above average, with some mistakes
	8 (C)	75-84	Average, with noticeable mistakes
	7 (D)	65-74	Generally good, but with significant mistakes
	6 (E)	55-64	Meets the minimum criteria
	5 (F, FX)	<55	Does not meet the minimum criteria
6. Literature	<p>Required:</p> <ul style="list-style-type: none"> Teaching material written by Medical Biochemistry Department personnel Smith C, Marks AD, Lieberman M. Marks' Basic Medical Biochemistry- A Clinical Approach. 4th ed. Lippincott Williams & Wilkins; 2013. 		

	<p>Recommended:</p> <ul style="list-style-type: none"> – Murray RF, Botham KM, Kennelly PJ, Rodwell VW. Harper's Illustrated Biochemistry. 30th ed. The McGraw-Hill Companies, Inc; 2015.
7. Remarks	<p>All forms of lectures and practical laboratory work are mandatory. Student attendance is regulated by the Law of Higher Education of Sarajevo Canton. Student absence should be justified by valid documentation. Lectures and laboratory practical work will be held at the Department of Medical Biochemistry</p> <p>Department of Medical Biochemistry</p> <p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Consultation: working days 1-2 p.m. at the Department or via e-mail sabaheta.hasic@mf.unsa.ba</p>

COURSE PLAN: MEDICAL BIOCHEMISTRY 2

Week 1		Hours
Monday	<p>Lecture: Carbohydrate metabolism – digestion, absorption, and transport of carbohydrates; glycolysis-pyruvate transformation under aerobic and anaerobic conditions – fate of lactate;</p> <p>Lecture: Tricarboxylic acid (TCA) cycle; respiratory chain – oxidative phosphorylation; energy yield from the TCA cycle and electron transport chain; formation and degradation of glycogen.</p>	<p>2</p> <p>2</p>
Tuesday	<p>Lecture: Gluconeogenesis and maintenance of blood glucose level; pentose phosphate pathway; fructose and galactose metabolism; basic concepts in the regulation of fuel metabolism.</p> <p>Practical: Qualitative test for urine glucose – Benedict’s test; anaerobic glycolysis product-lactate acid qualitative test; basics of photometry; determination of serum glucose level by spectrophotometry.</p>	<p>2</p> <p>3</p>
Wednesday	<p>Lecture: Lipid metabolism – digestion and transport of dietary lipids; the activation and oxidation of fatty acids; catabolism of triacylglycerol</p> <p>Lecture: Energy yield of beta oxidation and the electron transport chain; alternate route of fatty acid oxidation; synthesis of fatty acids and triacylglycerol.</p>	<p>2</p> <p>2</p>
Thursday	<p>Lecture: Synthesis and degradation of the major membrane lipids; lipoprotein metabolism – hyperlipoproteinemia and hypolipoproteinemia; cholesterol metabolism.</p> <p>Practical: Determination of serum triglycerides, total cholesterol and HDL cholesterol by spectrophotometry; calculation of LDL cholesterol using Friedwald formula; atherogenic index calculation; lipoprotein electrophoresis – computer simulation of separation and interpretation.</p>	<p>2</p> <p>3</p>
Friday	<p>Lecture: Synthesis of bile salts; regulation of lipid metabolism.</p> <p>Lecture: Abnormalities of lipid metabolism – metabolism of ketone bodies; protein digestion and amino acid absorption; biological value of protein nutrition and nitrogen balance.</p>	<p>2</p> <p>2</p>
Week 2		
Monday	<p>Lecture: Metabolism of amino acid, transamination, deamination, decarboxylation; fate of amino acid nitrogen: urea cycle; synthesis and degradation of amino acids – gluconeogenic and ketogenic amino acids; biosynthesis of amino acid-derived compounds.</p> <p>Practical: Qualitative reaction of inorganic, organic sulphate in urine-</p>	<p>2</p> <p>3</p>

	urinary indican; qualitative reaction of thiocyanate.	
Tuesday	<p>Lecture: Porphyrins metabolism – heme synthesis and breakdown; porphyria; heme degradation – structure of heme; bile pigment metabolism.</p> <p>Lecture: Regulation and abnormalities of protein metabolism – enzymopathies; nucleoproteins-purine and pyrimidine metabolism</p>	<p>2</p> <p>2</p>
Wednesday	<p>Lecture: Uric acid synthesis; abnormalities of purine metabolism; DNA and RNA metabolism – regulation of gene expression; DNA – based information technologies; protein synthesis.</p> <p>Practical: Qualitative reactions of bile pigments – urinary bilirubin and urobilinogen; quantitative estimation of serum bilirubin by spectrophotometry.</p>	<p>2</p> <p>3</p>
Thursday	<p>Lecture: Biochemistry of hormones – lipid-derived, amino acid – derived and peptide hormones; synthesis, degradation and mechanism of hormone action;</p> <p>Lecture: Signal molecules – growth factors and eicosanoids; biochemistry of blood, erythrocytes and the other blood cells.</p>	<p>2</p> <p>2</p>
Friday	Partial exam I	1
Week 3		
Monday	<p>Lecture: Biochemistry of blood, blood plasma proteins.</p> <p>Practical: Analysis of milk – carbohydrate, protein and lipid qualitative reactions.</p>	<p>2</p> <p>3</p>
Tuesday	<p>Lecture: Biochemistry of kidney; biochemical aspects of renal function-specificity of kidney metabolism.</p> <p>Lecture: Laboratory tests of renal function – creatinine, urea, uric acid; the composition of urine; bone and adipose tissue metabolism.</p>	<p>2</p> <p>2</p>
Wednesday	<p>Lecture: Extracellular matrix and connective tissue – fibrous proteins; proteoglycans; structure and function of proteoglycans; abnormalities in proteoglycans' metabolism (mucopolysaccharidosis).</p> <p>Practical: Qualitative tests for hormones: insulin, epinephrine, tiroxin; determination of total protein amount and albumin in blood; estimation of albumin/globulin ratio.</p>	<p>2</p> <p>3</p>

Thursday	<p>Lecture: Biochemistry of nervous system; metabolism of carbohydrates, lipids and amino acids in the brain; neurotransmitters – mechanism of action, synthesis and degradation; metabolism of glutamine in the brain.</p> <p>Lecture: Cerebrospinal fluid biochemistry; liver metabolism, carbohydrate, lipid and amino acid metabolism.</p>	2
Friday	<p>Lecture: Excretory liver function-bile salts, cholesterol, bile pigments; liver metabolism- function of liver in detoxification.</p> <p>Practical: Principle of blood detection – The Kastle-Meyer’s test; Test for occult blood – The Benzidine Reaction; The Fecal Occult Blood Test; Preparation of Haemin Crystals (Teichman Crystals).</p>	2 3
Week 4		
Monday	<p>Lecture: Metabolism of muscle at rest and during exercise; metabolism of the carbohydrate, lipid and amino acid in muscle cells; fuel utilization in cardiac and skeletal muscle.</p> <p>Practical: Determination of serum chloride and calcium by spectrophotometry; qualitative test for urinary chloride.</p>	2 3
Tuesday	<p>Lecture: Mild and moderate intensity, long-term exercise; metabolic effects of training on muscle metabolism.</p> <p>Practical: Urine analysis</p>	1 3
Wednesday	Practical: Determination of creatinine, urea and uric acid by spectrophotometry.	3
Thursday	Practical: Methods of enzyme activity measurement; spectrophotometric determination of serum aspartate aminotransferase and alanine aminotransferase activities;	3
Friday	Partial exam II	1
17.-18. week	Final exam (regular examination term)	
19.-20. week	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code: MFSE 0303	Course title: HISTOLOGY 1		
Level: preclinical	Study year: II	Semester: III	ECTS: 6
Status: obligatory	Weeks: 15	Total contact hours: 70	
Prerequisites: According to the study regulation			
Lecturers: Associate Professor Selma Aličelebić, MD PhD; Associate Professor Esad Čosović, MD PhD; Assistant professor Dina Kapić, MD PhD; Assistant professor Maida Šahinović, MD PhD; Assistant Samra Čustović, MD; Assistant Višnja Muzika, MD			
1. Overall aim	To acquire knowledge of morphofunctional characteristics of cells and tissues of the human body for whose light and electron microscopic observation is necessary to adopt basic knowledge of histotechnology. To acquire knowledge about the normal structure of the body as an integration of homogeneous and heterogeneous cell populations, as well as knowledge of the specifics of intercellular matrix and fibers. The acquired knowledge of Histology 1 represents the basis for understanding of the pathological changes of cells and tissues.		
2. Course contents	The above mentioned topics will be covered within the following modules: Module 1. Morphofunctional characteristics of human cells with the basics of histotechnology Module 2. Histology of tissues		
3. Learning outcomes (knowledge, skills and competences)	Students will be able to understand the structure of the human body as a unit consisting of individual mutually integrated structural components and their organizational modalities, and they will be competent in recognizing normal cytological and histological structure, and their deviations, on the basis of experience gained by microscopic analysis. Lectures and practical work are focused on providing theoretical knowledge and practical skills to master the microscopic analysis of histological slides and the analysis of electron microscope images. In this course students will acquire the following knowledge and competences : <ul style="list-style-type: none">– know the normal microscopic and submicroscopic structure of human cells from the aspect of their morphological and functional diversity– learn the significance of the relationship between changes of the structural elements of cells and the carefully selected clinical symptoms of disorders on the basis of different histotechnological approaches– know the normal microscopic and submicroscopic structure of human tissues and their morphological and functional diversity– understand tissue distribution throughout organs and organ systems. <i>The skills that a student needs to know to perform effectively (knows how to do and does):</i> <ul style="list-style-type: none">– to observe and analyze the cytological and histological slides– to analyze microscopical slides of blood smears using oil immersion– to analyze and interpret electron micrographs– to draw independently cytological and histological slides– to label structural parts in the drawings of cytological and histological slides independently.		

	<p><i>The skills that a student needs to know (knows how):</i></p> <ul style="list-style-type: none"> – histotechnological methods of slides preparation for the level of available histological techniques and basic methods. <p>After the end of the course, the student should adopt the following attitudes:</p> <ul style="list-style-type: none"> – good knowledge of the normal microscopic and submicroscopic structure of cells and tissues accompanied by high-quality microscopic analysis is a prerequisite for understanding the functions of cells and organs – the above mentioned is a necessary prerequisite for a better understanding of many disorders. 												
4. Teaching methods	<p>Lectures: 41 hours</p> <p>Practical work and repetitorium of practicals: 29 hours</p>												
5. Method of knowledge assessment and examination	<p>Continuous assessment of acquired skills and knowledge will be carried out in the frame of practical work evaluation and partial exams.</p> <p>Practical work evaluation</p> <p>Students can participate in 6 practical work evaluations in each module (not obligatory). For each evaluation student can score 0, 1.5, 2.0 or 2.5 points and gain at maximum 15 points per one module.</p> <p>Partial exam 1 (Module 1)</p> <p>Partial exam 1 is composed of theoretical part and practical work. Theoretical part is designed as an essay (extended response question). Practical work includes the analysis of two histological slides as well as the analysis of selected electron micrograph. The grading scale has a maximum of 35 points. To pass the exam student must meet minimal criteria by scoring 23 points. To complete partial exam, student must score at least minimum points in both parts (theory + practical work).</p> <p>Partial exam 2 (Module 2)</p> <p>Partial exam 2 is composed of theoretical part and practical work. Theoretical part is designed as an essay (extended response question). Practical work includes the analysis of two histological slides, one selected electron micrograph as well as recognition of blood cells in peripheral blood smears (3 slides). The grading scale has a maximum of 35 points. To pass the exam student must meet minimal criteria by scoring 23 points. To complete partial exam, student must score at least minimum points in both parts (theory + practical work).</p> <p>Final grade is formed by summing up the points scored on both partial exams (obligatory) and the points earned during the practical work evaluation.</p> <table border="1"> <thead> <tr> <th>Assessment</th><th>Points</th></tr> </thead> <tbody> <tr> <td>Partial exam 1</td><td>35</td></tr> <tr> <td>Practical work evaluation 1</td><td>15</td></tr> <tr> <td>Partial exam 2</td><td>35</td></tr> <tr> <td>Practical work evaluation 2</td><td>15</td></tr> <tr> <td>Σ</td><td>100</td></tr> </tbody> </table> <p>Completion of assessment will be done in form of oral examination, if necessary.</p>	Assessment	Points	Partial exam 1	35	Practical work evaluation 1	15	Partial exam 2	35	Practical work evaluation 2	15	Σ	100
Assessment	Points												
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Σ	100												

	<p>Final exam</p> <p>If the student did not complete one of the partial exams during the semester, the same takes in final exam (regular, re-sit and fall examination term).</p> <p>Final grade is determined based on the following criteria:</p> <table><tr><th>Grade</th><th>Cumulative points</th><th>Grade description</th></tr><tr><td>10 (A)</td><td>95-100</td><td>Remarkable success without mistakes or with minor errors</td></tr><tr><td>9 (B)</td><td>85-94</td><td>Above the average, with some mistakes</td></tr><tr><td>8 (C)</td><td>75-84</td><td>Average, with noticeable errors</td></tr><tr><td>7 (D)</td><td>65-74</td><td>Generally good but with significant shortcomings</td></tr><tr><td>6 (E)</td><td>55-64</td><td>Meets the minimum criteria</td></tr><tr><td>5 (F, FX)</td><td>< 55</td><td>Does not meet the minimum criteria</td></tr></table>	Grade	Cumulative points	Grade description	10 (A)	95-100	Remarkable success without mistakes or with minor errors	9 (B)	85-94	Above the average, with some mistakes	8 (C)	75-84	Average, with noticeable errors	7 (D)	65-74	Generally good but with significant shortcomings	6 (E)	55-64	Meets the minimum criteria	5 (F, FX)	< 55	Does not meet the minimum criteria
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5 (F, FX)	< 55	Does not meet the minimum criteria																				
6. Literature	<p>Obligatory:</p> <ul style="list-style-type: none">– Mescher AL. Junqueira's Basic Histology (text & atlas), 13th edition, McGraw-Hill, 2013.– Alicelebic S, Cosovic E, Kapic D, Sahinovic M, Muzika V, Custovic S. Histology 1 – A practical guide for students. Sarajevo: Faculty of Medicine; 2017. <p>Recommended:</p> <ul style="list-style-type: none">– Cooper MG, Hausman ER. The Cell: A Molecular Approach, 6th edition, Sinauer Associates, 2013 (selected chapters)– <i>Alberts B, Johnson A, Lewis J, et al. Molecular Biology of the Cell, 6th edition, Garland Science, 2014 (selected chapters)</i>																					
7. Note	<p>Fixing absences from classes should be in accordance with legal regulations. Consultations with teaching stuff are possible every working day from 11:30 – 13:00 h.</p> <p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: histologija@mf.unsa.ba</p>																					

COURSE PLAN: HISTOLOGY 1

Days	Form of Instructions and materials	Number of classes
Day 1.	Lecture: Microscopy and histological techniques	3
	Practical laboratory work: Histotechnology laboratory	2
Day 2.	Lecture: Cell membrane	3
	Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (cell membrane, microvilli) – Light microscopy (spherical cell shape-oocyte and pyramidal cell shape-nerve cell) 	2
Day 3.	Lecture: Endosome. Lysosome. Peroxysome	3
	Practical laboratory work: Analysis of electron micrographs (endosome, lysosome, peroxysome)	2
Day 4.	Lecture: Endoplasmic reticulum	3
	Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (endoplasmic reticulum) – Light microscopy (rough endoplasmic reticulum-indirectly-protein-synthesizing cell, smooth endoplasmic reticulum-indirectly-steroid-secreting cell) 	2
Day 5.	Lecture: Golgi apparatus. Mitochondrion	3
	Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (Golgi apparatus, mitochondrion, glandular cell) – Light microscopy (glandular cell-thyreocyte) 	2
Day 6.	Lecture: Cytosol	3
	Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (actin filaments, intermediate filaments, microtubules, cilia) – Light microscopy (lipid droplets, pigment granules, and cilia) 	2
Day 7.	Lecture: Nucleus. Cellular junctions	3
	Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (nucleus, cellular junctions) – Light microscopy (nucleus-blood smear) 	2
Day 8.	Midterm exam I (partial exam)	2
Day 9.	Lecture: Epithelial tissue	3
	Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (basal membrane) – Light microscopy (simple squamous epithelium, simple columnar epithelium, pseudostratified epithelium, stratified squamous epithelium, transitional epithelium, exocrine gland- 	2

	tubular, alveolar)	
Day 10.	Lecture: Connective tissue proper and connective tissue with special properties Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (fibroblast) – Light microscopy (mesenchyme, reticular connective tissue, dense irregular connective tissue, dense regular connective tissue, white adipose tissue) 	3 2
Day 11.	Lecture: Supporting connective tissue Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (osteocyte) – Light microscopy (hyaline cartilage, elastic cartilage, lamellar bone, endochondral ossification) 	3 2
Day 12.	Lecture: Blood, lymph, and bone marrow Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (erythrocytes, lymphocytes, neutrophils, eosinophils, trombocytes) – Light microscopy (peripheral blood smear, bone marrow smear) Repetitorium of practicals	3 2 1
Day 13.	Lecture: Muscle tissue Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (smooth muscle, cardiac muscle, skeletal muscle, endocrine cardiomyocyte) – Light microscopy (smooth muscle, cardiac muscle, skeletal muscle) 	3 2
Day 14.	Lecture: Nervous tissue Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (astrocyte, oligodendrocyte, microgliocyte, nerve fibers) – Light microscopy (multipolar neurons, pseudounipolar neurons and amphyocytes, nerve fibres) 	3 2
Day 15.	Midterm exam II (partial exam)	2
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September make-up exam)	

Code: MFSE 0304	Course title: NEUROPSYCHOLOGY		
Level: preclinical	Study year: II	Semester: III	ECTS: 4
Status: obligatory	Total contact hours: 60		
Prerequisites:	According to the study regulations		
Lecturers: Assistant Professor Orhan Lepara MD PhD, MD PhD, Professor Asija Začiragić MD PhD, Assistant Professor Amela Dervišević MD PhD, , Assistant Professor Amina Valjevac MD PhD			
1. Overall aim	The overall aim of the Neurophysiology course is to increase understanding of nervous system function and regulation.		
2. Course contents	The following topics will be covered within the Modules: Module 1. Functional organization of the nervous system Module 2. Neuron signaling Module 3. Autonomic nervous system Module 4. Somatic senses Module 5. Special senses Module 6. Control of motor function Module 7. Higher cortical functions		
3. Learning outcomes	<p>Students will acquire knowledge necessary for understanding the organizational levels of nervous system, its function at different organizational levels. The student will learn the regulation of physiological functions by nervous system. Knowledge and skills gained through the Course will help students in their further medical education and later work in practice.</p> <p><i>Through the lectures and seminar, the students will gain following knowledge and competences:</i></p> <ol style="list-style-type: none">1. Know functional organization of the nervous system, motor and sensory axis of the nervous system and neural circuits involved in information processing.2. Learn different types of synapses, excitatory and inhibitory postsynaptic potential and physiological roles of neurotransmitters.3. Understand functional organization and physiological role of the autonomic nervous system, receptors of autonomic nervous system and autonomic reflexes.4. Understand and learn sensory receptors and somatic senses.5. Know dioptric and photoreceptive functions of the eye.6. Understand sound perception, physiology of smell and taste.7. Learn the movement control and motor functions of nervous system8. Develop a basic understanding of the higher cortical functions including mental and cognitive functions.9. Know physiological basis of learning and memory, bioelectrical brain activity, dreams and sleeping. <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ol style="list-style-type: none">8. Interpretation of polygram<ul style="list-style-type: none">- Tactile sensibility assessment- Two points discrimination test- Different type of lenses determination- Vision acuity test- Color vision test- Direct pupillary reflex- Consensual reaction to light- Determination of near and far sight point- Rinne test- Weber test		

	<ul style="list-style-type: none"> - Tendon reflexes - Cutaneous and conjunctival reflexes <p>9. Interpretation of electroencephalogram</p>
4. Teaching methods	<p>Lectures: 18 hours Seminars: 12 hours Laboratory practical work: 30 hours</p>
5. Method of knowledge assessment and examination	<p>- Written tests in the form Extended response questions (ERQ) tests</p> <p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Colloquiums</p>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> – Hall J E. Guyton and Hall Textbook of Medical Physiology. 12th edition. Elsevier Saunders; 2010. <p>Additional:</p> <ul style="list-style-type: none"> – Ganong WF. Review of Medical Physiology. Lange Medical Publications, Los Altos; 2003. – Boron WF, Boulpaep EL. Medical physiology. Elsevier Saunders; 2005.
7 Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: fiziologija@mf.unsa.ba</p>

COURSE PLAN: NEUROPHYSIOLOGY

Weeks	Form of Instructions and materials	Number of classes
Week 1	Lecture: Organization of the Nervous System, Basic Functions of Synapses	2
	Practical laboratory work: Neuron excitability (CD presentation, A.D.A.M., Interactive Phys lab)	2
Week 2	Lecture: Neurotransmitters and modulators. Neuronal Circuits for Processing Information	2
	Practical laboratory work: Synaptic transmission (CD presentation, A.D.A.M., Interactive Phys lab)	2
Week 3	Lecture: Somatic Sensations: General Organization, the Tactile and Position Senses. Pain, and Thermal Sensations	2
	Practical laboratory work: Examination of tactile receptors Two-point discrimination test Stereognosia Thermoreceptor adaptation test	2
Week 4	Lecture: Autonomic nervous system	2
	Practical laboratory work: Polygraph Tests (BIOPAC)	2
Week 5	Seminar: The Special Senses. The Chemical Senses—Taste and Smell. Optics of Vision.	2
	Practical laboratory work: Colloquium 1	2
Week 6	Lecture: Receptor and Neural Function of the Retina. Central Neurophysiology of Vision.	2
	Practical laboratory work: Testing the taste sensation Testing the smell sensation	2
Week 7	Lecture: The Sense of Hearing.	2
	Practical laboratory work: Sound conduction: Rinne's test, Weber's test Schwabach's test Sound localization test	2

Week 8	<p>Seminar: Partial exam 1</p> <p>Practical laboratory work: Types of lenses, Visual acuity (VA) test, Perimetry, Color Blindness Test; Test for Astigmatism</p>	2 2
Week 9	<p>Seminar: Motor Functions of the Spinal Cord; the Cord Reflexes.</p> <p>Practical laboratory work: Pupillary (light) reflex, Consensual light reflex Protective eye reflex, Corneal reflex, Eye muscles, Mechanical Stimulation of the Eye. Mariotte's experiment</p>	2 2
Week 10	<p>Lecture: Cortical and Brain Stem Control of Motor Function. Vestibular Sensations and Maintenance of Equilibrium.</p> <p>Practical laboratory work: Accommodation reflex Scheiner experiment (CD presentation) Range of accommodation Power of accommodation</p>	2 2
Week 11	<p>Lecture: Contributions of the Cerebellum and Basal Ganglia to Overall Motor Control</p> <p>Practical laboratory work: Colloquium 2</p>	2 2
Week 12	<p>Seminar: The Integrated System for Motor Control. Cerebral Cortex, Intellectual Functions of the Brain, Learning and Memory.</p> <p>Practical laboratory work: Tendon (deep) reflexes Superficial reflexes Abdominal reflex</p>	2 2
Week 13	<p>Lecture: Learning and Memory Behavioral and Motivational Mechanisms of the Brain—The Limbic System and the Hypothalamus</p> <p>Practical laboratory work: Testing balance Evaluation of short-term memory capacity</p>	2 2

Week 14	Seminar: States of Brain Activity—Sleep, Brain Waves	2
	Practical laboratory work: EEG registration and analysis (BIOPAC)	2
Week 15	Seminar: Partial exam 2	2
	Practical laboratory work: Colloquium 3	2
Weeks 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code: MFSE 0305	Course title: Bosnian language 3		
Level: preclinical	Study year: II	Semester: III	ECTS: 2
Status: obligatory	Total contact hours: 30		
Prerequisites:	According to the Study Regulation		
Lecturers:	Engaged teachers from the core faculty		
1. Overall aim	The overall aim of the Bosnian language 3 is to teach students the very basis of the Bosnian language, culture and geography. Through the lectures, students will learn to understand questions and instructions and to follow simple directions. Also, students will be able to identify key information from newspaper articles, use more complex phrases related to personal life, studies and work environment. Student will also be able to understand intermediate medical vocabulary.		
2. Course contents	Following topics will be covered throughout the lectures: <ul style="list-style-type: none"> - <i>Learning and practicing communication/questions in Bosnian language</i> - <i>Reading selected articles related to Bosnian culture and attitudes</i> - <i>Writing messages and notes</i> - <i>Communication with patients</i> 		
3. Learning outcomes (Knowledge, skills and competences)	<p>Listening: After this course, students will be able to understand phrases and highest frequency vocabulary related to more complex situations in everyday life. Students will acquire the needed knowledge in order to be able to understand key messages on TV and other types of media.</p> <p>Reading: Student will learn to read simple text in Bosnian language, and will be able to find specific information in everyday materials.</p> <p>Speaking: Communication on this level is based on exchange of very simple information on familiar topics and activities. They will learn to present themselves and exchange simple social information.</p> <p>Writing: Students will learn to write simple and short notes related to their background, daily activities, family and friends. They will learn and practice simple medical words and phrases.</p> <p>Grammar: Students are expected to achieve a corresponding level of Bosnian grammatical structures, and to be able to use main features of the language.</p>		

4. Teaching methods	<p>The course is performed in form of</p> <p>Lectures (15)</p> <p>Practical works (15)</p>
5. Methods of knowledge assessment and examination	<p>EXAM</p> <ol style="list-style-type: none"> 1. Partial exam (8th week) 2. Final exam (after the course)
6. Literature	<ol style="list-style-type: none"> 1. Midhat Riđanović, Bosnian for Foreigners, Spirit of Bosnia Volume 7 No. 3 (2012) (selected parts) 2. Minela Kerla i Nermina Alihodžić-Usejnovski, Bosanski jezik: komunikacijski priručnik za strance sa zadacima i vježbama, Sarajevo, 2013 (selected parts) 3. English-Bosnian dictionary upon own choice
7. Remarks	<p>Student office hours are published on the faculty website. Pre-agreed consultations are obligatory, and can be scheduled via e-mail: studentska.sluzba@mf.unsa.ba</p>

BOSNIAN LANGUAGE III

Implementation plan

Week	Teaching methods and materials	Number of hours
Week 1.	Lecture: Cases. Basic meanings and uses.	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 2.	Lecture: Verb aspects: Perfective and imperfective	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 3.	Lecture: Comparison of adjectives.	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 4.	Lecture: Personal and possessive pronouns.	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 5.	Lecture: Reflexive verbs (<i>se</i> -verbs).	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 6.	Lecture: Imperative.	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 7.	Lecture: Word order.	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 8.	MID-TERM (PARTIAL) EXAM	2
Week 9.	Lecture: Congruence of numbers with complements.	1
	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 10.	Lecture: Plural genitive.	1

	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 11.	Lecture: Congruence in gender, number and case. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 12.	Lecture: Verbs denoting existence (<i>biti, imati</i>) Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 13.	Lecture: Time expressions. Dates. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week14.	Lecture: Adjectives. Idiomatic expressions with adjectives. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 15.	Lecture: Recapitulation of the learned grammar. Practical work: Spontaneous conversation. Speaking and writing exercises.	1 1
Week 17.-18.	Final exam (regular term)	
Week 19.-20.	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code: MFSE 0306		Course title: MEDICAL CYTOGENETICS	
Level: preclinic	Study year: II	Semester: IV	ECTS: 1
Status: Elective	Total contact hours: 20		
Prerequisites:	According to the Study Regulation		
Lecturers: Assistant Professor Azra Metović Assistant Professor Jasmin Mušanović			
1. Overall aim	The overall aim of the Medical Cytogenetics course is to expand the theoretical knowledge about the constitutive well as acquired chromosomal aberrations, to acquire practical knowledge on techniques of classical and molecular cytogenetics, and possibilities for their applications in the diagnosis, prevention and treatment.		
2.Course contents	The following topics will be covered within the Modules: Module 1. Cytogenetics in medical practice Module 2. Methods of classical and molecular cytogenetics Module 3. Cytogenetics features and clinical manifestations of chromosome aberrations Module 4. Genetic information (advice)		
3.Learning outcomes (Knowledge, skills and competences)	Students will acquire knowledge necessary for understanding normal and changed human chromosomes constitution as a determining factor in etiology, manifestation and inheritance of pathological conditions in the human population. They will be able to understand the importance of karyotype analysis in patients with reproductive problems, congenital anomalies and those that are suffering from cancer, as well as importance of respecting ethical standards. <i>Through the lectures students will gain following knowledge :</i> <ol style="list-style-type: none">1. Understanding the importance and portion of chromosome constitution in the etiology, inheritance and manifestation of pathologic conditions in the human population.2. Selection the appropriate cytogenetic research in chromosomopathy diagnostics and to understand how to read formula and where to apply it.3. The risk assessment of physical and chemical mutagenes.4. Appropriate geneticinformation about a patient. <i>Through the practical laboratory work students will acquire following skills:</i> <ul style="list-style-type: none">• Establishing a culture of human peripheral blood lymphocytes• Preparation of human karyotype• Identification of normal and aberrant karyotype by microscopic analysis		

	<ul style="list-style-type: none"> • Identification of chromosomal aberration (numerical / structural) • Arranging and interpreting of karyogram • Writing the appropriate formula of karyotype • Assessment of the risk of manifestation/repeating of certain chromosomopathy • Differentiate constitutional and acquired karyotype
4.Teaching methods	<p>Lectures 10 hours</p> <p>Practical work: 10 hours</p>
5.Method of knowledge assessment and examination	<p>Written tests in the form of - Multiple choice questions - (MCQ) tests and Extended response questions (ERQ) tests.</p> <p>Continuous knowledge and skills assessment will be carried out through Partial exams and Partial Laboratory Colloquium.</p>
6. Literature	<ol style="list-style-type: none"> 1. Hong Fong L.M. Medical Cytogenetics. Marcel Dekker AG: 2000. 2. ISCN 2013: International System for Human Cytogenetic Nomenclature. KARGER; 2013. 3. Ilbrulj S, Haverić S. Haverić A. Citogenetičke metode - primjena u medicini. Institut za genetičko inženjerstvo i biotehnologiju. Sarajevo ; 2008
7.Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: biologija@mf.unsa.ba</p>

COURSE PLAN: MEDICAL CYTOGENETICS

Weeks	Form of Instructions and materials	Number of classes
Week 1.	Lecture: Introduction to cytogenetics: historical development of cytogenetics as a science, possibilities and purpose of application in medical practice. Human cytogenetic nomenclature.	2
Week 2.	Exercises: Organization of cytogenetic laboratories and principles of work in it.	1
Week 3.	Lecture: Prenatal and postnatal cytogenetic diagnostics of constitutive and acquired chromosome aberrations: indications, patterns, methods and their diagnostic potential. Methods of classical and molecular cytogenetics: FISH (fluorescent in situ hybridisation), CGH (comparative genetic hybridization), SKY (spectral karyotyping), Clinical application and diagnostic potential in the identification and characterization of chromosomal diseases / conditions.	2
Week 4.	Exercises: Checking previously accepted skills. Culture and harvest of tissues for chromosome analysis	1
Week 5.	Exercises: Microscopic analysis of the karyotype. Metaphase arranged in standard karyotype format and interpretation of the findings	1
Week 6.	Exercises: Checking previously accepted skills. Methods of classical cytogenetics and their application: chromosome aberration test, micronucleus test, sister chromatid exchange test.	2
Week 7.	Mid-term exam 1 (Partial exam 1)	1
Week 8.	Lecture: Cytogenetic features and clinical manifestations of common structural and numerical chromosome aberrations (etiology, incidence, characteristics, consequences and risk of repetition, phenotype / genotype correlation.	2

Week 9.	Exercises: Checking previously accepted skills. Interphase and metaphase FISH: microscopic analysis and interpretation.	1
Week 10.	Exercises: Chromosomal changes in the karyotype of persons with physical and mental disorders.	1
Week 11	Exercises: Checking previously accepted skills. Microscopic analysis of karyotype and identification of different aberrations in patients with leukemia	1
Week 12.	Lecture: Reproductive Effects of Balanced Chromosomal Redistribution. Cytogenetics of malignant diseases. Clinical significance of cytogenetic findings in oncology.	2
Week 13.	Lecture: Genetic information ("advice"): indications (to whom and when?) Postulates, goals, significance, phases, risk / exposure assessment, ethical principles.	2
Week 14.	Exercises: Checking previously accepted skills. Interpretation of specific cytogenetic findings from practice.	2
Week 15.		
Weeks. 17/18	Final exam (regular term)	1
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September make-up exam)	

Code:MFSE 0307	Course title: FUNDAMENTALS OF HUMAN NUTRITION		
Level: preclinical	Study year:II	Semester: III	ECTS: 1
Status:elective	Total contact hours: 20		
Prerequisites:	According to the Study Regulation		
Lecturers: Associate Professor Amra Čatović MD PhD			
1. Overall aim	The overall aim of the Fundamental of Human Nutrition course is to provide the basis of human nutrition, to enable students to understand and think critically about the complex interrelationships between food, nutrition, health, and environment.		
2. Course contents	The following topics will be covered during the Modules: Module 1. Functions of nutrients Module 2. Energy balance Module 3. Nutrition guidelines Module 4. The relationship between diet and chronic disease Module 5. Gene-nutrient interactions		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge necessary for understandingthe issues regarding dietary requirements and recommendations, nutrient composition of foods, assessment of nutritional status, physical activity, and relationship of human nutrition to health and disease.</p> <p>They will be able to identify pathologies associated with nutrient deficiencies, nutrient toxicities, as well as the role of nutrition in type II diabetes, coronary heart disease, cancer, and obesity.</p> <p>Students will be able to independently solve problems which require active participation.</p> <p>Through practical work the students will acquire knowledge to usenutrition screening in the health care and assessthe severityof illness. They will be able to evaluate diet specific components based on the data of foods and beverages intake. They will be able to incorporate preventive nutrition guidance in diet planning.</p> <p><i>Through the lectures the students will gain following knowledge and competences to:</i></p> <ol style="list-style-type: none">1. Know the biological functions and food sources of each nutrient. Define nutrient and energy density food and identify foods that are considered to be nutrient or energy dense.2. Summarize the heterogeneity in individual and group nutritional needs, practices and tolerances.3. Understand how nutrition and genetics can interface. Explain the importance of DNA methylation and the roles of micronutrients in this process. Explain the role of vitamins on gene regulation. Explain the role of nutrition on genome stability.4. Use current information technologies to locate and apply evidence-based guidelines and protocols. Analyze current recommendations related to macronutrient-related diseases (e.g. atherosclerosis, obesity, diabetes, cancer). Evaluate the role of nutrition in health maintenance and disease prevention. <p><i>Through the practical work students will acquire following skills to:</i></p> <ul style="list-style-type: none">- Identify appropriate information to screen patients for nutritional risk- Interview patients/clients to obtain nutrition/dietary history information- Asses dietary patterns- Choose adequate method for measuring dietary intakes (foods, nutrients)		

	<ul style="list-style-type: none">- Collect and interpret anthropometric data- Plan healthy diet																					
4. Teaching methods	Lectures: 10 hours Practical work: 10 hours																					
5. Method of knowledge assessment and examination	<p>Knowledge assessment will be carried out continuous during the semester and as written final exam.</p> <p>Continuous knowledge and skills assessment will be carried out through completing assignments, class participation, and Diet Analysis/Planning Project.</p> <p>Final exam will consist of 2 parts: test in the form of Multiple choice questions (MCQ) test and Extended response questions (ERQ) test.</p> <p>Final grades will be distributed as follows: Attendance, completing assignments and class participation in discussion groups: 30 points Diet Analysis/Planning Project: 30 points Final Exam: 40 points</p> <p>Final grade will be calculated as a pondered arithmetic mean (i.e. joint arithmetic mean) of all grades given throughout semester. Grading of writing parts of the exam will be performed with respect to rules and regulations of syllabi harmonization of Bologna studying for every single exam term as following:</p> <table><tr><th>Grade</th><th>No of points</th><th>Grade description</th></tr><tr><td>10 (A)</td><td>95-100</td><td>Exceptional with minor errors</td></tr><tr><td>9 (B)</td><td>85-94</td><td>Above average with few errors</td></tr><tr><td>8 (C)</td><td>75-84</td><td>Average, with noticeable errors</td></tr><tr><td>7 (D)</td><td>65-74</td><td>Good, with significant errors</td></tr><tr><td>6 (E)</td><td>55-64</td><td>Meets minimal criteria</td></tr><tr><td>5 (F, FX)</td><td>< 55</td><td>Fails to meet minimal criteria</td></tr></table>	Grade	No of points	Grade description	10 (A)	95-100	Exceptional with minor errors	9 (B)	85-94	Above average with few errors	8 (C)	75-84	Average, with noticeable errors	7 (D)	65-74	Good, with significant errors	6 (E)	55-64	Meets minimal criteria	5 (F, FX)	< 55	Fails to meet minimal criteria
Grade	No of points	Grade description																				
10 (A)	95-100	Exceptional with minor errors																				
9 (B)	85-94	Above average with few errors																				
8 (C)	75-84	Average, with noticeable errors																				
7 (D)	65-74	Good, with significant errors																				
6 (E)	55-64	Meets minimal criteria																				
5 (F, FX)	< 55	Fails to meet minimal criteria																				
6. Literature	<p>Required</p> <ul style="list-style-type: none">– Frumkin H. Environmental Health: From Global to Local. San Francisco: Jossey-Bass; 2016. <p>Additional</p> <ul style="list-style-type: none">– Whitney EN, Rolfes SR, Understanding Nutrition, 13th edition, Wadsworth Cengage, 2013 (chapters according to modules)																					
7. Remarks	<p>All proposed teaching types are obligated. In case a student misses more than 10% of classes (excused or not excused) one is obliged to colloquially pass the missed.</p> <p>Consultation hours are every day 12.00-13.00 with prior announcement by email: amra.catovic@mf.unsa.ba</p>																					

SECOND YEAR

FOURTH SEMESTER (SUMMER)						
Code	Course Title	L	P	S	TCH	ECTS
MFSE 0401	Human Physiology 2	39	45	16	100	9
MFSE 0402	Histology 2 and Embryology	56	39		95	8
MFSE 0403	Immunology	20	18	12	70	4
MFSE 0404	Medical Informatics	15	15		30	2
MFSE 0405	Biostatistics	14	15	1	30	2
MFSE 0406	Hygiene	10	10	10	30	2
MFSE 0407	Bosnian Language 4	15	15		30	2
MFSE 0408-0411	Elective Course 1	10	10		20	1
	TOTAL	179	167	39	385	30

Elective Courses:

MFSE 0408 Integrative Systems of Human Body

MFSE 0409 Neuroendocrine Regulation of Bone Remodeling

MFSE 0410 Despite all we are alkaline

MFSE 0411 Introduction to Practical Epidemiology

Code:MFSE 0401	Course title: HUMAN PHYSIOLOGY 2		
Level: preclinical	Study year: II	Semester: IV	ECTS: 9
Status: obligatory	Total contact hours: 100		
Prerequisites:	According to the study regulations		
Lecturers: Assistant Professor Amina Valjevac MD PhD, Professor Asija Zaćiragić MD PhD, Assistant Professor Amela Dervišević MD PhD, Assistant Professor Orhan Lepara MD PhD,			
1. Overall aim	The overall aim of the Physiology course is to increase understanding of the fundamental mechanisms of how cells, organ systems function and are regulated under normal physiological conditions.		
2. Course contents	The following topics will be covered during the Modules: Module 1. Blood and hemostasis Module 2. Gastrointestinal physiology Module 3. Renal physiology Module 4. Endocrine physiology, metabolism and thermoregulation Module 5. Reproductive physiology		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge necessary for understand the normal functioning of the body which is basis for further successful following of medicine program and their future independent work.</p> <p>They will be able to describe and distinguish between all organ systems, starting from molecular through cellular and organ level. Finally, all processes will be integrated at the level of the entire organism.</p> <p>Students will be able to independently solve problems which requires active participation.</p> <p>Through practical work the students will understand the task of integrating the acquired knowledge and using skills of classical physiological laboratory experiments.</p> <p><i>Through the lectures and seminars, the students will gain following knowledge and competences:</i></p> <p>Know physiological roles of blood system, blood clotting mechanisms, function of the immune system based on chemical communication and molecular interactions.</p> <p>Discover how the digestive system maintains mass balance and homeostasis through the process of secretion, absorption, and movement of nutrients and molecules across membranes. Understand that energy balance and metabolism are dependent upon intake, output, and the neuro-endocrine hormones mediating food intake.</p> <p>Learn that the urinary and renal systems play a vital role in human physiology in terms of absorption, excretion, and filtration. Acquire the knowledge on body fluids homeostasis and its composition including the role of renal system in acid base balance.</p> <p>Develop a basic understanding of the endocrine system, its function on growth and metabolism, and how each hormone has stimuli that initiate its secretion and feedback signals that modulate its release. Know how the endocrine system plays a major role in communication and control of physiological processes via hormonal interactions and pathways.</p> <p>Understand that the reproductive system has one of the most complex control systems of the body, where multiple hormones interact in an ever-changing fashion in negative and positive feedback effects.</p>		

	<p>Through the practical laboratory work students will acquire following skills:</p> <ul style="list-style-type: none"> - Blood sampling - Serum and plasma separation - Erythrocytes sedimentation rate and hematocrit measurement - Hemoglobin measurement - Erythrocyte and leukocyte count - Blood clotting tests - Blood types analysis - Kidney function assessment - Determination of renal clearance - Neto-filtration and neto-absorbion pressure assessment - Acid-base status assessment - Measurement of basal metabolism - Daily energy needs assessment -Calculation of daily food intake -Measurement of blood glucose -Oral glucose tolerance test -Body composition and body mass index assessment -Waist circumference measurement -Pregnancy test -Fertility tests
4. Teaching methods	<p>Lectures: 39 hours Seminars: 16 hours Laboratory practical work: 45 hours</p>
5. Methods of knowledge assessment and examination	<ul style="list-style-type: none"> - Written tests in the form of Multiple choice questions (MCQ) tests and - Oral examination <p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical laboratory Colloquium</p>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> – Hall J E. Guyton and Hall Textbook of Medical Physiology. 12th edition. Elsevier Saunders; 2010. <p>Additional:</p> <ul style="list-style-type: none"> – Boron and Boulpaep. Medical Physiology. 2nd edition. Saunders Elsevier; 2009.
7 Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: fiziologija@mf.unsa.ba</p>

COURSE PLAN: HUMAN PHYSIOLOGY 2

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<p>Lecture: The Body Fluid compartments: extracellular and intracellular fluids; interstitial fluid</p> <p>Lecture: Multiple functions of the kidneys in homeostasis, the nephron is the functional unit of the kidney, glomerular filtration</p> <p>Practical laboratory work: Osmotic resistance of red blood cells, Hemolysis of red blood cells</p>	<p>2</p> <p>2</p> <p>3</p>
Week 2.	<p>Lecture: Renal Blood Flow, determinants of GFR and renal blood flow</p> <p>Lecture: Urine formation by the kidneys: tubular processing of the glomerular filtrate</p> <p>Practical laboratory work: Renal physiology (CD presentation, A.D.A.M., Interactive Phys lab)</p>	<p>2</p> <p>2</p> <p>3</p>
Week 3.	<p>Lecture: Regulation of extracellular fluid osmolality and sodium concentration</p> <p>Seminar: Renal Regulation of Potassium, Calcium, Phosphate, Magnesium;</p> <p>Practical laboratory work: Renal physiology (CD presentation, A.D.A.M., Interactive Phys lab); Renal clearance tests</p>	<p>2</p> <p>2</p> <p>3</p>
Week 4.	<p>Lecture: Integration of renal mechanisms for control of blood volume and extra-cellular fluid volume</p> <p>Lecture: Acid base balance</p> <p>Practical laboratory work: Acid base balance (CD presentation, A.D.A.M., Interactive Phys lab) and Problem based learning - acid base balance</p>	<p>1</p> <p>2</p> <p>3</p>
Week 5.	<p>Seminar: Micturition, Renal clearance</p> <p>Lecture: Physiological roles of blood, red blood cells, blood types, transfusion</p> <p>Practical laboratory work: Colloquium 1, Blood sampling, Red blood cells count (RBC)</p>	<p>1</p> <p>2</p> <p>3</p>
Week 6.	Lecture: Hemostasis and Blood Coagulation	

	Lecture: Resistance of the Body to Infection: Leukocytes, granulocytes, the monocyte-macrophage system, immunity Practical laboratory work: Determination of erythrocyte sedimentation rate (ESR), hemoglobin and hematocrit (Hct), calculation of blood indices	2 3
Week 7.	Seminar Partial exam 1 Lecture: General principles of gastrointestinal function - motility, nervous control, and blood circulation, propulsion and mixing of food in the alimentary tract Practical laboratory work: Case report - anemia	2 2 3
Week 8.	Seminar: Secretory functions of the alimentary tract Lecture: <i>Digestion and absorption in the gastrointestinal tract</i> Practical laboratory work: Total leukocyte (white blood cells) count and differential leukocyte count (DLC)	2 2 3
Week 9.	Seminar: Liver, bile and pancreas physiology Lecture: Dietary balances and regulation of feeding Practical laboratory work: Determination of bleeding time, determination of clotting time, blood typing, skills repetition	2 2 3
Week 10.	Seminar: Obesity and starvation Lecture: Coordination of body functions by chemical messengers, introduction to endocrinology Practical laboratory work: Colloquium 2	1 2 3
Week 11.	Lecture: Pituitary Hormones and Their Control by the Hypothalamus Lecture: Thyroid Metabolic Hormones Practical laboratory work: Body composition analysis; body mass index; assessment of body fat distribution, measurement of waist and hip circumferences; waist-to-hip ratio, energy expenditure, estimation of basal metabolic rate, estimation of daily energy needs, basal metabolic rate and body size, thyroid gland and metabolic rate (cd physiology interactive lab simulations. 2.0)	2 2 3
Week 12.	Lecture: Adrenocortical and adrenomedullary hormones, stress Lecture: Insulin and glucagon Practical laboratory work: Glucose homeostasis, determination of blood	2 2

	glucose level Oral Glucose Tolerance Test (OGTT)	3
Week 13.	Seminar: Energetics and metabolic rate, body temperature, temperature regulation Lecture: Parathyroid hormone, calcitonin, calcium and phosphate metabolism, vitamin D, bone and teeth Practical laboratory work: Definition of principles of healthy diet; Individually daily meal plan, Salivary flow rate test	2 2 3
Week 14.	Lecture: - Female physiology before pregnancy and female hormones Seminar: Reproductive and hormonal functions of the male Practical laboratory work: Menstrual cycle - ovarian and uterine cycle pregnancy test, female fertility tests, male fertility tests	2 1 3
Week 15.	Seminar: Reproduction, pregnancy and lactation Seminar: Partial exam 2 Practical laboratory work: Colloquium 3	1 2 3
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination exam)	

Code: MFSE 0402	Course title: HISTOLOGY 2 AND EMBRYOLOGY		
Level: preclinical	Study year: II	Semester: IV	ECTS: 8
Status: obligatory	Weeks: 15	Total contact hours: 95	
Prerequisites: According to the Study Regulation			
Lecturers: Associate Professor Selma Aličelebić, MD PhD; Associate Professor Esad Čosović, MD PhD; Assistant professor Maida Šahinović, MD PhD; Assistant professor Dina Kapić, MD PhD; Assistant Višnja Muzika, MD; Assistant Samra Čustović, MD			
1. Overall aim	The aim of the course is to teach students the basics of morpho-functional properties of organs and organ systems visible at the light and electron microscopic levels, within the scope of the hierarchical model of organization of the human body. At the same time, the students study the development of the human conceptus and the most common anomalies and this allows them to understand the complex relationships in the structure of the human body.		
2. Course contents	<p>The above mentioned topics will be covered within the following modules:</p> <p>Module 1. Histology of organs and organ system. General and special human embryology Male reproductive system. Female reproductive system. General embryology. Alimentary canal. Accessory digestive glands. Vascular system. Respiratory system.</p> <p>Module 2. Histology of organs and organ system. Special human embryology Urinary system. Immune system. Lymphatic organs. Endocrine system. Reproductive system (embryology). Nervous system. Sense organs. Skin.</p>		
3. Learning outcomes (knowledge, skills and competences)	<p>Students will be able to understand the structure of organs and the intrauterine development of the body as a unit consisting of individual mutually integrated systems. They will also be able to analyze histological slides of adult and fetal tissues and organs on the basis of their own experience, as well as to perform analysis of relevant photo documentation and to gain confidence in recognizing important histological and embryonic structures.</p> <p>Lectures and practical classes are focused on providing theoretical knowledge and practical skills to master the microscopical analysis of histological slides of fully developed organs and organs during development, and the analysis of electron microscopic images and photo documentation of embryonic structures.</p> <p>In this course students will acquire the following competencies:</p> <ul style="list-style-type: none">– know the histological structure of organs and organ systems– understand the complex events during the development of the human conceptus– gain confidence in recognizing important histological and embryonic structures based on personal experience, by analyzing histological slides of organs and human conceptus microscopically as well as by analyzing relevant photo documentation– learn how the most significant developmental anomalies arise, and what their relevance for clinical practice is. <p><i>The skills that a student needs to know to perform effectively (knows how to do and does):</i></p> <ul style="list-style-type: none">– to observe and analyze histological slides of fully developed organs and developing organs, to make drawings and to label independently relevant details in the drawings		

	<ul style="list-style-type: none"> – to analyze and interpret electron microscope images – to correctly interpret the observed morphological structure of fully developed organs and organs during development <p><i>The skills that a student needs to know (knows how):</i></p> <ul style="list-style-type: none"> – application of essential knowledge and skills of cytology and tissue histology at the level of formed organs and the level of their embryonic status – application of integrated knowledge and skills in the interpretation of normal and abnormal development of human tissues and organs <p>At the end of the course, the student should adopt the following attitudes:</p> <ul style="list-style-type: none"> – proper observation and analysis of cell and tissue slides is a prerequisite for adequate knowledge acquisition regarding histological structure of fully developed organs and organs during development – good knowledge of normal microscopic and submicroscopic structure of the body is a prerequisite for understanding its functions – knowledge of the normal structure and function of organs is a prerequisite for understanding their disorders – knowledge of normal human development is a prerequisite for a better understanding of its complex structure and the possible occurrence of a developmental anomaly
4. Teaching methods	<p>Lectures: 56 hours</p> <p>Practical work and repetitorium of practicals: 39 hours</p>
5. Method of knowledge assessment and examination	<p>Continuous assessment of acquired skills and knowledge will be carried out in the frame of practical work evaluation and partial exams.</p> <p>Practical work evaluation</p> <p>Students can participate in 7 practical work evaluations in Module 1 and 5 practical work evaluations in Module 2. Participation in all above mentioned evaluations is not obligatory. For each evaluation student can score 0, 1.5, 2.0 or 2.5 points and gain at maximum 17,5 points (Module 1) and 12,5 points (Module 2).</p> <p>Partial exam 1 (Module 1)</p> <p>Partial exam 1 is composed of theoretical part and practical work. Theoretical part is designed as an essay (extended response question). Practical work includes the analysis of two histological slides as well as the analysis of selected electron micrograph. The grading scale has a maximum of 35 points. To pass the exam student must meet minimal criteria by scoring 23 points. To complete partial exam, student must score at least minimum points in both parts (theory + practical work).</p> <p>Partial exam 2 (Module 2)</p> <p>Partial exam 2 is composed of theoretical part and practical work. Theoretical part is designed as an essay (extended response question). Practical work includes the analysis of two histological slides and one selected electron micrograph. The grading scale has a maximum of 35 points. To pass the exam student must meet minimal criteria by scoring 23 points. To complete partial exam, student must score at least minimum points in both parts (theory + practical work).</p> <p>Final grade is formed by summing up the points scored on both partial exams (obligatory) and the points earned during the practical work evaluation.</p>

Assessment	Points
Partial exam 1	35
Practical work evaluation 1	17.5
Partial exam 2	35
Practical work evaluation 2	12.5
Σ	100

Completion of assessment will be done in form of oral examination, if necessary.

Final exam

If the student did not complete one of the partial exams during the semester, the same takes in final exam (regular, re-sit and fall examination term).

Final grade is determined based on the following criteria:

Grade	Cumulative points	Grade description
10 (A)	95-100	Remarkable success without mistakes or with minor errors
9 (B)	85-94	Above the average, with some mistakes
8 (C)	75-84	Average, with noticeable errors
7 (D)	65-74	Generally good but with significant shortcomings
6 (E)	55-64	Meets the minimum criteria
5 (F, FX)	< 55	Does not meet the minimum criteria

6. Literature

Obligatory:

- Mescher AL. Junqueira's Basic Histology (text & atlas), 13th edition, McGraw-Hill, 2013
- Sadler TW. Langman's Medical Embryology, 11th edition, Lippincott Williams & Wilkins, 2011
- Handouts/Teaching materials.

Recommended:

- Ross MH, Pawlina W. Histology: A Text and Atlas, with Correlated Cell and Molecular Biology, 6th ed. LWW; 2010 (selected chapters).
- Schoenwolf GC, Bleyl SB, Brauer PR, Francis-West PH. Larsen's Human Embryology. 5th ed. Churchill Livingstone; 2014 (selected chapters).

7. Note

Fixing absences from classes should be in accordance with legal regulations. Consultations with teaching personnel are possible every working day from 11:30 – 13:00 h.

Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: histologija@mf.unsa.ba

COURSE PLAN: HISTOLOGY 2 AND EMBRYOLOGY

Days	Form of Instructions and materials	Number of classes
Day 1.	Lecture: Male reproductive system (histology) Practical laboratory work: <ul style="list-style-type: none"> – Light microscopy (testicle, epididymis, ductus deferens, penis, prostate) 	4 2
Day 2.	Lecture: Female reproductive system (histology). General embryology Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (placenta) – Light microscopy (ovary, oviduct, uterus, vagina, mammary gland, placenta, umbilical cord) 	4 2
Day 3.	Lecture: Alimentary canal (oral cavity, esophagus) (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Light microscopy (lips, teeth, tooth development, tongue, taste buds, esophagus) 	4 2
Day 4.	Lecture: Alimentary canal (stomach, small intestine, large intestine, anal canal) (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (gastric epithelium, small intestinal epithelium) – Light microscopy (stomach, small intestine – duodenum, jejunum, ileum, large intestine – colon, appendix, anal canal) 	4 2
Day 5.	Lecture: Accessory digestive glands (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (liver) – Light microscopy (parotid gland, sublingual gland, liver, gallbladder, pancreas) Repetitorium of practicals	4 2 3
Day 6.	Lecture: Vascular system (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (capillaries) – Light microscopy (muscular arteries, elastic arteries, veins) 	4 2
Day 7.	Lecture: Respiratory system (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (lungs) – Light microscopy (nasal cavity – olfactory mucosa, epiglottis, trachea, lungs) Repetitorium of practicals	4 2 4

Day 8.	Midterm exam I (partial exam)	
Day 9.	Lecture: Urinary system (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (kidney) – Light microscopy (kidney, ureter, urinary bladder, urethra) 	4 2
Day 10.	Lecture: Immune system. Lymphatic organs. (histology) Practical laboratory work: <ul style="list-style-type: none"> – Light microscopy (palatine tonsil, lymph node, spleen, thymus) Repetitorium of practicals	4 2 2
Day 11.	Lecture: Endocrine system Practical laboratory work: <ul style="list-style-type: none"> – Analysis of electron micrographs (enteroendocrine cell, thyroid gland) – Light microscopy (hypophysis, epiphysis, thyroid gland, parathyroid gland, adrenal gland) 	4 2
Day 12.	Lecture: Endocrine system (embryology). Reproductive system (embryology) Practical laboratory work: <ul style="list-style-type: none"> – Photomicrographs and scheme (fetal endocrine glands, fetal gonads) 	4 2
Day 13.	Lecture: Nervous system (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Light microscopy (cerebrum, cerebellum, spinal cord, spinal ganglion, spinal nerve, lamellar corpuscle, neural tube development) 	4 2
Day 14.	Lecture: Sense organs. Skin (histology and development) Practical laboratory work: <ul style="list-style-type: none"> – Light microscopy (skin, nail, eye – retina, iris, cornea, lacrimal gland, eye development, organ of Corti) Repetitorium of practicals	4 2 4
Day 15.	Midterm exam II (partial exam)	
Weeks 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination exam)	

Code: MSFE 0403	Corse title: IMMUNOLOGY		
Level: preclinical	Study year: II	Semester IV	ECTS: 4
Status: mandatory	Total contact hours: 50		
Lecturers: Assistant professor Izeta Aganović - Mušinović			
Prerequisites: According to study regulations			
1. Overall aim	The overall aim of the Immunology Course is to provide understandable information of the basic immune system components and their various interactions. -		
2. Course contents	The following topics will be covered within the Modules: Module 1. Innate immune system Module 2. Genes and Antigens Module 3. Humoral immunity Module 4. Cell (adoptive) immunity Module 5. Organs of the immune system Module 6. Immune system interactions Module 7. Physiological and altered tolerance (autoimmunity) Module 8. Tumor immune reactions, tissue and organ transplantation Module 9. Immunity and infections Module 10. Immunization		
3. Learning outcomes (Knowledge, Skills and Competences)	<p>Students will acquire knowledge necessary for understanding the function of the immune system as well as mal-function that leads to different immune diseases, and maintaining of the immune defense during the invader threat.</p> <p>Through the lecturers and seminars, the students will gain the following knowledge and competences:</p> <ol style="list-style-type: none">1. Learn general principals of the Immunology2. Learn about Innate Immune System3. Understand antigens, epitopes, immunogenicity, MHC molecules class I and II, and the theory of “clonal selection”4. Understand polymorphism of antibodies, immunology of the B- lymphocyte5. Understand Cell (adoptive) immunity, immunology of T- lymphocytes, immunosuppression and immune-stimulation6. Learn about immune system organs and their function7. Learn about tolerance induction, MHC restriction, autoimmunity, immunologic hypersensitivities.8. Learn about tumor antigens, immune reaction on tumor and theory of immune surveillance, immune-therapy and principals of transplantation immunology.9. Learn about virulation and infection, immune reaction (innate and adoptive), principals of vaccination, concept of immunodeficiency’s (primary and secondary),10. Learn the basic immunology techniques. <p><i>Through the practical laboratory work students will acquire the following skills:</i></p> <ul style="list-style-type: none">- Agglutination test (RF, CRP)- ELISA test- PCR		

	<ul style="list-style-type: none">- Electrophoresis, Western blot- Immunofluorescence technique																					
4.Teaching methods	<ul style="list-style-type: none">- Lectures: 20 hours- Seminars: 12 hours- Laboratory audio-practical work: 18 hours																					
5.Methods of knowledge assessment and examination	<p>Written test in the form of – Multiple-choice question (MCQ) test and Extended response question (ERQ) test.</p> <ul style="list-style-type: none">- Oral examination- Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical laboratory Colloquium. <p>The final grade is calculated in consideration with archived points of all types of knowledge assessment</p> <table><tr><th>Grade</th><th>Number of points</th><th>Grade description</th></tr><tr><td>10 (A)</td><td>95-100</td><td>Extraordinary achievements with insignificant or no mistakes</td></tr><tr><td>9 (B)</td><td>85-94</td><td>Above average with few mistakes</td></tr><tr><td>8 (C)</td><td>75-84</td><td>Average with notable mistakes</td></tr><tr><td>7 (D)</td><td>65-74</td><td>Generally good with significant failure</td></tr><tr><td>6 (E)</td><td>55- 64</td><td>Satisfy minimal criteria</td></tr><tr><td>5 (F, FX)</td><td>< 55</td><td>Do not satisfy minimal criteria</td></tr></table>	Grade	Number of points	Grade description	10 (A)	95-100	Extraordinary achievements with insignificant or no mistakes	9 (B)	85-94	Above average with few mistakes	8 (C)	75-84	Average with notable mistakes	7 (D)	65-74	Generally good with significant failure	6 (E)	55- 64	Satisfy minimal criteria	5 (F, FX)	< 55	Do not satisfy minimal criteria
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6 (E)	55- 64	Satisfy minimal criteria																				
5 (F, FX)	< 55	Do not satisfy minimal criteria																				
6. Literature	<p>Mandatory</p> <ul style="list-style-type: none">– Abbas AK, Lichtman AH. Basic Immunology and Disorders of the Immune System, 3rd edition, Elsevier-Saunders; 2009.– Delves PJ. Martin SJ, Burton DR, Roitt IM, Roitt's Essential Immunology, 12th edition. Wiley-Blackwell, 2011. <p>Additional</p> <ul style="list-style-type: none">– Lauren Sompayrac. How the Immune System Works. 5th edition, Blackwell Publishing; 2010.																					
7. Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department’s notice-board and on faculty website.</p> <p>Pre-agreed consultations are obligatory, and can be scheduled via e-mail: izeta.aganovic@mf.unsa.ba</p>																					

COURSE PLAN: IMMUNOLOGY

Weeks	Form of Instructions and materials	Number of classes
Week 1.	Lecture: Overview of Immunology; Immunology recognition	2
Week 2.	Lecture: Innate Immunology; Immune system organs	2
Week 3.	Seminar: Cells of the Immune System	2
	Demonstrated laboratory method: Flow cytometry	1
Week 4.	Lecture: Antigens; Genes and Antigens of Histocompatibility; Complement	2
	Practical work: Polymerase Chain Reaction (PCR); Electrophoresis, Immunoelectrophoresis and Western blot	2
Week 5.	Seminar: Structure and features of antibodies and antigen receptor of B cells; Humoral Immunity	2
	Practical work: Polymerase Chain Reaction (PCR); Electrophoresis, Immunoelectrophoresis and Western blot	2
Week 6.	Lecture: Physiologic course and immune reaction regulation; Interaction between immune cells.	2
	Practical work: Agglutination method: CRP	2
Week 7.	PARTIAL EXAM I	2
	Practical work: Enzyme Linked Immuno Sorbent Assay - ELISA	2
Week 8.	Lecture: T-cell development, structure of TCR; activation and life-span of T lymphocytes; Cell Immunity	2
	Practical work: Enzyme Linked Immuno Sorbent Assay - ELISA	2
Week 9.	Lecture: Cytokines and Chemokines- their impact and function	2
	Demonstrated laboratory method: Precipitation and complement fixation reaction	1

Week 10.	Seminar: Immunotolerance; Autoimmunity	2
	Practical work: Immunofluorescence and ENA-6 profile	2
Week 11.	Lecture: Immunologic Hypersensitivities	2
	Demonstrated laboratory method: RIA; RIST; RAST; IRMA	2
Week 12.	Lecture: Immune reaction to tumor	2
	Demonstrated laboratory method: Application of immunologic methods in detecting malignant diseases	2
Week 13.	Seminar: Organ and Tissue Transplantation	2
	Demonstrated laboratory method: Immunologic patient processing for transplantation	1
Week 14.	Lecture: Immunology in infectious diseases	2
	Lecture: Immunodeficiency	2
Week 15.	PARTIAL EXAM 2	2
Weeks. 17/18	Final exam (regular term)	2
Weeks 19/20	Final exam (make-up examination term)	2
September	Final exam (September examination exam)	2

Code: MFSE 0404	Course title: Medical Informatics		
Level: preclinical	Study year: II	Semester: IV	ECTS: 2
Status: obligatory	Weeks: 15	Total contact hours: 30	
Prerequisites:	According to the study regulations		
Lecturer: Assistant professor Ahmed Novo PhD, MS, MD			
1. Course objectives:	Course Objectives the Basics of Medical Informatics is to introduce students with basic concepts of information technology and their application in everyday life. Particular emphasis is placed on the acquisition of knowledge related to the future work of physicians on computers in healthcare institutions.		
2. Purpose:	Provide knowledge in the field of basic things like MS Office, then work in databases and their application in everyday practice		
3.Outcomes	Module 1. Introduction to Medical Informatics The aim of the module is to familiarize students with terms and definitions: knowledge, knowledge, knowledge base, system and system analysis, healthcare classification systems, medical records and records in health care, medical decision making, quality and quality assessment, biomedical sciences and expert information systems , Information Medical Technology, Health Information Systems, Computer Learning Methods, etc. Students should familiarize themselves with the history of computing and Medical Informatics in BiH and in the world, and of the place of Medical Informatics in the organization of health systems. Module 2. Data, Information and Knowledge, and Methods of Data Manipulation The aim of the module is to introduce students to the operations of collecting and processing medical data: manual, semi-automatic or via computers, using databases used today in computer science or through ICT. Students will also be familiar with the information theory and methods of manipulation with medical data for the purpose of performing daily medical practice or in medical research. Module 3. System and system analysis and health system The aim of the module is to familiarize students with the concepts and definitions of system and systemic analysis, principles of work and functioning of the system in general, and especially health systems from the primary to the quaternary level of the health system. Then, students are introduced to the concept of communication and its use in medical informatics and communication systems in healthcare		

	<p>Module 4. Medical documentary</p> <p>The aim of the module is to familiarize students with the concepts and definitions of medical records and recording, the legislation in this area at all levels of health management, information flows, the functioning of the health-statistical system and the minimal set of health data important for the functioning of all forms and levels of health care system from local to national level, required for statistical research in health care.</p> <p>Module 5. Nomenclature and Classification Systems</p> <p>The aim of the module is to provide students with the concepts and definitions of nomenclature and classification in health care. Through this method unit students will be introduced to the history of the development of classification systems in medicine, as well as the structure and contents of the International Classification of Diseases, Injuries and Causes of Death (ICD), Unified Nomenclature of Medical Services (UNMS), International Classification of Medical Procedures (ICMP), Anatomy -Therapeutic-Chemical Classification (ATC), Diagnostic Relation Groups (DSG) and other classification systems.</p> <p>Module 6. Models, Modeling and Computer Simulation</p> <p>The objective of the module is to introduce students to the concept of modeling and modeling, model types and model and theory relationships. Also, students need to acquire knowledge in the field of model construction and modeling phases, simulation concepts, types and ways of using modeling and simulation in healthcare and clinical medicine.</p>
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	<p>Module 7. Medical Decisions Making</p> <p>The aim of the module is to familiarize students with the subject and importance of medical decision-making at all levels of decision-making in the physician-patient-consortium of doctors-families, etc. Special attention is paid to informed consent of the patient or family in situations where decisions are to be made. Also, students are introduced to the general approach to medical decision-making, the role and importance of medical robotics and artificial intelligence in the medical decision-making system. Through the lecture will be introduced also with expert systems, neurons and bioregulators that are necessary for making quality health decisions at all levels of healthcare delivery in the healthcare system.</p> <p>Module 8. Biomedical scientific and expert information system</p> <p>The aim of the module is to get acquainted with the concepts, content and functioning of the biomedical scientific and professional information system. It will also discuss topics of scientific publishing through books, monographs, scientific journals, citations and references in professional literature, and in particular the research of biomedical computer index databases.</p> <p>Module 9. Computers in Education and Research</p> <p>The aim of the module is to familiarize students with the technological assumptions about innovation, history and the main problems in designing and implementing computer-based learning programs and modern information communication technologies (ICTs). Students should be introduced to Computer Assisted Learning and Distance Learning Biomedical Learning Methods, and the assumptions for using telematics, telemedicine, and telemedicine in biomedical disciplines using computers in education and research in medicine and healthcare.</p>
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	<p>Module 10. Information Technology in Medicine and Health</p> <p>The aim of this module is to introduce students to the history and development of medical technologies and to share information technology in medicine and healthcare (diagnostics, therapy, rehabilitation). There will also be discussion about the use of electronic data carriers (EHR) for the purpose of collecting and storing medical information stored at each meeting of a physician-patient and patient information related to the use of diagnostics, therapies, rehabilitation procedures, financial indicators medical services, etc.</p> <p>Module 11. Local Health Information Systems</p> <p>Students are introduced to the concepts, significance, content, organization and functioning of local health information systems at the unit level of Family Medicine. Particular attention will be paid to the paper and electronic way of keeping records and electronic data storage through the Family Registration Card.</p> <p>Module 12. Health Information Systems of Health Homes</p> <p>Students are introduced to the concepts, significance, content, organization and functioning of local health information systems at the health care center level. The medical records and their creation and electronic management for everyday needs and statutory statistical research in health care will be analyzed.</p> <p>Module 13. Diagnostic-Polyclinic Health Information Systems</p> <p>Students are introduced to the concepts, significance, content, organization and functioning of health information systems in diagnostic-polyclinic activities. Students will be introduced to the leading ICT technologies and PACS, DICOM, etc. signal transmission systems.</p>
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4. Teaching methods	<p>Module 14. Hospital and Clinical Health Information Systems</p> <p>Students become acquainted with the concepts, importance, content, organization and functioning of health information systems in general and special hospitals and University Clinical Centers. Particular emphasis will be placed on hospital classification systems and their electronic management and analysis - MKB, ACT, DRG, etc.</p> <p>Module 15. International Health Information Systems</p> <p>Students will be introduced to global health information systems. In particular, the HFA World Health Organization database will be treated as a global health information system for health research needs.</p>
	<p>Teaching from the Basics of Medical Informatics implies a total fund of 30 hours, of which 15 are theoretical classes and 15 hours of practical classes.</p>
	<p>Practical part of the exam is done on a computer, theoretical part of the exam is done through a computer test and additional oral exam. The computer test is a Multiple-choice (MC) type. The evaluation is verified as a partial exam from the Basic Medical Informatics Course and entered at the end of the index scale E to A.</p>
	<p>6. Literature</p> <ul style="list-style-type: none"> • Mašić I, Riđanović Z. Medicinska informatika, knjiga I (Osnove Medicinske informatike). Avicena, Sarajevo, 2001. • Mašić I, Pandža H. Praktikum iz medicinske informatike. Avicena, Sarajevo, 1999. <p>Dodatna literatura:</p> <ul style="list-style-type: none"> • Deželić G. Zdravstvena informatika. Udžbenici Sveučilišta u Zagrebu, Zagreb, 2000. • Kern J, Božikov J. Praktikum iz zdravstvene informatike. Udžbenici Sveučilišta u Zagrebu, Zagreb, 2000.
7. Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: medicinska.informatika@mf.unsa.ba</p>

COURSE PLAN: MEDICAL INFORMATICS

Weeks	Form of Instructions and materials	Number of classes
Week 1.	Theory: Module 1. Introduction to Medical Informatics Practical: Computer components and principles of work	1 1
Week 2.	Theory: Module 2. Data, Information and Knowledge, and Methods of Data Manipulation Practical: System software	1 1
Week 3.	Theory: Module 3. System and system analysis and health system Practical: Windows operation system	1 1
Week 4.	Theory: Module 4. Medical documentary Practical: Text processing (MS Word)	1 1
Week 5.	Theory: Module 5. Nomenclature and Classification Systems Practical: Data base use (ACCESS)	1 1
Week 6.	Theory: Module 6. Models, Modelling and Computer Simulation Practical: Data base use (ACCESS)	1 1
Week 7.	Theory: Module 7. Medical Decisions Making Practical: EXCEL	1 1
Week 8.	Theory: Module 8. Biomedical scientific and expert information system Practical: EXCEL	1 1
Week 9.	Theory: Module 9. Computers in Education and Research Practical: Medical applicative software	1 1
Week 10.	Theory: Module 10. Information Technology in Medicine and Health Practical: Medical applicative software	1 1
Week 11.	Theory: Module 11. Local Health Information Systems Practical: Internet use in medicine	1 1

Week 12.	Theory: Module 12. Health Information Systems of Health Homes	1
	Practical: Internet use in medicine	1
Week 13.	Theory: Module 13. Diagnostic-Polyclinic Health Information Systems	1
	Practical: Preparation of medical data for analysis	1
Week 14.	Theory: Module 14. Hospital and Clinical Health Information Systems	1
	Practical: Preparation of medical data for analysis	1
Week 15.	Theory: Module 15. International Health Information Systems	1
	Practical: Preparation and student tasks during practical work	1
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination exam)	

Code: MFSE 0405	Course title: BIostatISTICS		
Level: preclinical	Study year: Second	Semester: IV	ECTS: 3
Status: obligatory	Total contact hours: 30		
Prerequisites:	According to study regulation		
Lecturers: Prof. Semra Čavaljuga, MD, MSc, DSc; senior assistant Enisa Ademović, MD, MSc, senior assistant Lejla Džananović, MD, MSc			
1. Overall aim	Students should familiarize themselves and master the basic methods in data collection and analysis in medical research. They should master data collection on their own as well as design of simple research in order to better understand scientific literature, as well as proper use of all health-statistics sources. Students should be able to evaluate the appropriateness of statistical and analytical methods and data presentation methods used in medical and other literature.		
2. Course objectives	Students should master the basic elements and application of data collection methods as well as basics of medical research and other basic research methods of data analysis and statistical inference, that are required in further medical education for easier understanding of advanced medical knowledge.		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students should master the following elements:</p> <p>1. Introduction to biostatistics (Why biostatistics?) Students will familiarize themselves with roots in biostatistics evolution, aims, methods, definitions and elements in biostatistics as well as the place of statistics and biostatistics in medical theory and practice.</p> <p>2. Data collection methods</p> <p>2.1 Methods of data collection and organization 2.2 Introduction to sampling methods 2.3 Preparation and questionnaire design</p> <p>Aim of this module is for students to familiarize themselves with organization of statistical research, methods of data collection, data organization (statistical series and types), master basics in sampling methods and questionnaire design, through practical examples.</p> <p>3. Statistical data analysis</p> <p>3.1 Data presentation using tables and graphs 3.2 Descriptive biostatistics – results interpretation and analysis 3.3 Results representativeness</p> <p>Aim of this module is for students to master basics of adequate data presentation through tables and graphs, as well as methods of descriptive data analysis – frequencies and frequency distribution tables – and results through examples from real medical practice.</p> <p>4. Objectives and hypotheses formulation in quantitative research Aim of this module is for students to master adequate objectives formulation, learn what a hypothesis is, and how to formulate one in a simple research.</p> <p>5. Objectives and hypothesis testing in quantitative research Aim of this module is for students to master testing of adequately stated research objectives, know what hypothesis testing is and how to test a hypothesis in simple research.</p> <p>6. Demographic and vital statistics with measures of disease frequency Aim of this module is for students to know the basics of demographic and vital statistics including their use in medicine.</p> <p>7. Data analysis using information technologies / computers Aim of this module is familiarization with basics of data analysis using computer software.</p>		

	<p>Students should master basic elements and methods of data collection as well as basics in medical research and data analysis, needed for understanding of advanced knowledge during further medical education.</p> <p>Students should master the following skills and competencies:</p> <ul style="list-style-type: none"> - Know how to explain the necessity to learn and understand biostatistics in medical theory and practice - Know how to collect data from available sources and own research - Group and code data (when needed) - Master the basics of sampling methods (simple and stratified samples) and how to choose a representative sample - Design a statistically correct and clear table - Choose and design a correct type of graph - Calculate and interpret measures in summary statistics (measures of central tendency) <p>Every student should know how to:</p> <ul style="list-style-type: none"> - Choose a method and size of a sample and apply a sampling method - Differ between representative and non-representative sample - Design a questionnaire for a specific research - Interpret different types of graphs - Interpret differences and interconnections between measures of central tendency - Differ between types of frequency distribution - Formulate research objectives - Formulate and test research hypotheses - Argument the difference between good and bad data and results presentation <p>Attitudes a student should master after the completion of this course:</p> <ul style="list-style-type: none"> - Knowing basic bio statistical methods and elements facilitates the understanding of literature data and helps in everyday medical theory and practice - There are representative and non-representative data - Statistically correct tables and graphs give clear notion of the problem, unlike those that are statistically incorrect - Results will be valid only if adequate method of data collecting is applied - Knowing the methodology of calculation and interpretation of measures of central tendency is very useful as well for further medical education - Every research has to have a correctly stated objective(s) and hypotheses - Only research with adequately chosen sample and stated objectives and hypotheses produce scientifically valid and applicable results.
4. Teaching methods	<p>Every lecture lasts <u>45 minutes</u>.</p> <p>Introductory lectures are of classic – collective type, while others are organized either as a “sandwich” – interactive collective type or individual learning through interactive lecturing. Wherever possible, examples from real life research and bio statistical practice are given.</p> <p>Every <u>lab session</u> lasts <u>45 minutes</u>, exceptionally 90 minutes (with respect to the specific lab session contents).</p> <p>They are all designed as interactive, problem oriented and with examples from real life practice. Students should work in small groups of optimally 10 – 15</p>

	<p>student's maximum.</p> <p>In semester, there will be total of:</p> <ul style="list-style-type: none"> – 14 hours of lectures; – 14 lab sessions / contact with TAs (total of 14 contact hours with TAs) plus 1 hour for individual work on seminar paper – 1 hour of seminar paper presentation (for a grade) 								
<p>5. Methods of knowledge assessment and examination</p>	<p>Knowledge assessment will be performed through:</p> <ul style="list-style-type: none"> – short tests / quizzes – total of 3 per semester – total of 3 <p>(Each will have 5 MC questions with 4-5 given answers, lasting 10 minutes max. Will be performed before a start of a lecture. Results will be given in a passed or failed form (+/-), with given a pass with 3 or more correctly answered questions. If a student fails a test, when taking a final exam, he/she will be given an opportunity to take that test again, if one wants. If a test is passed during the course of lectures, a student will be given a grade 10; if passed later a grade 8 will be given. If a test is not passed at all, a grade 5 will be given.</p> <ul style="list-style-type: none"> – written exam based on MCQ methodology with 4-5 given answers on 2/3 of the questions; 1/3 of the questions will be in the essay form or calculation. It will be organized after the completion of lectures. – individual work on seminar paper on given topic – oral final exam will be organized for students wanting a higher grade or exceptional students. <p>Seminar paper means individual work on and writing of a paper (in groups) on subjects of questionnaire design, statistical analysis of data collected and presentation of results. It is based, in consultation with a lecturer and a TA, on project methodology (i.e. questionnaire design for a specific study with choosing a sample and descriptive analysis or critical review on given material on sampling and questionnaire design) and will be publicly presented before other fellow students.</p> <p>Grading will be performed by points given for every part of the studying activity and knowledge testing during the semester and on the final exam, by the following structure:</p> <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 40px;">– short tests / quizzes</td><td style="text-align: right;">30% of the final grade</td></tr> <tr> <td style="padding-left: 40px;">– written exam</td><td style="text-align: right;">40% of the final grade</td></tr> <tr> <td style="padding-left: 40px;">– seminar paper and presentation</td><td style="text-align: right;">20% of the final grade</td></tr> <tr> <td style="padding-left: 40px;">– homework</td><td style="text-align: right;">10% of the final grade</td></tr> </table> <p>Final grade will be calculated as a pondered arithmetic mean (i.e. joint arithmetic mean) of all grades given throughout semester.</p> <p>Grading of writing parts of the exam will be performed with respect to rules and regulations of syllabi harmonization of Bologna studying for every single exam term as following:</p>	– short tests / quizzes	30% of the final grade	– written exam	40% of the final grade	– seminar paper and presentation	20% of the final grade	– homework	10% of the final grade
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6. Literature	<p>Required:</p> <ul style="list-style-type: none">- Course hand-outs- Essex-Sorlie D. Medical Biostatistics and Epidemiology. Appleton and Lange. Connecticut, 1995. <p>Additional:</p> <ul style="list-style-type: none">- Chap TL. Introductory Biostatistics. Wiley-Interscience. New Jersey; 2003- H. Harris and G. Taylor. Medical Statistics Made Easy. Taylor & Francis, 2004. <p><i>(This literature might be helpful to students who have Bosnian language skills)</i></p> <ul style="list-style-type: none">- S. Čavaljuga, E. Ademović, L. Džananović. Biostatistika: teoretske osnove s primjerima. Medicinski fakultet Univerziteta u Sarajevu, 2018.- S. Čavaljuga, M. Čavaljuga. Biostatistika Osnovni principi i metode. Medicinski fakultet Univerziteta u Sarajevu 2009.																					
7. Remarks:	<p>It is forbidden to bring unauthorized copies of literature to classes!</p> <p>All forms of classes are obligatory. In case a student misses more than 10% of classes (excused or not excused) one is obliged to colloquially pass all the missed lectures and lab session in agreement with TAs and/or lecturer. Failed or missed quizzes can be re-taken on the final exam if a student wishes so.</p> <p>Consultation hours are every day 08.30-10.00 and 13.00-14.30 with prior announcement with the Department's Secretary or by email: epidemiologija@mf.unsa.ba</p>																					

COURSE PLAN: BIOSTATISTICS

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<p>Lecture:</p> <ul style="list-style-type: none"> A. Introduction to biostatistics (Why biostatistics?) <ul style="list-style-type: none"> a. Biostatistics through history b. Subjects and methods of biostatistics c. Basic terms and elements d. Aims and purpose of biostatistics e. B. Basics of data collection methods I (types of variables) <p>Practicals:</p> <p>Practical work on data collection methods – types of variables</p>	<p>1</p> <p>1</p>
Week 2.	<p>Lecture:</p> <p>Data collection methods II</p> <ul style="list-style-type: none"> a. Means and methods of data collection b. Sampling, types of samples <p>Practicals:</p> <p>Practical work on data collection methods – sampling</p>	<p>1</p> <p>1</p>
Week 3.	<p>Lecture:</p> <p>Data collection methods III – Questionnaire preparation and design</p> <p>Practicals:</p> <p>Practical work on data collection methods - questionnaire preparation and design</p>	<p>1</p> <p>1</p>
Week 4.	<p>Lecture:</p> <p>Data organization</p> <ul style="list-style-type: none"> A. Numerical data series (simple statistical series, frequencies distribution series, interval statistical series) B. Other types of data series <p>Practicals: Practical examples of statistical data analysis: data organization - types of data series, frequency distributions, relative and cumulative</p>	<p>1</p> <p>1</p>

	frequencies	
Week 5.	<p>Lecture: Statistical data analysis (descriptive biostatistical methods) – data presentation</p> <p>a. Tables</p> <p>b. Graphs</p> <p>Practicals:</p> <p>Practical examples on descriptive data analysis – graphical data presentation</p>	<p>1</p> <p>1</p>
Week 6.	<p>Lecture:</p> <p>Statistical data analysis II (descriptive biostatistical methods): measures of central tendency</p> <p>a. Means (arithmetic, geometric, harmonic, logarithmic)</p> <p>b. Mode and median</p> <p>Short quiz No 1.</p> <p>Practicals:</p> <p>Practical examples on descriptive data analysis – calculation and interpretation of measures of central tendency</p> <p><i>Assigning topics for seminar work</i></p>	<p>1</p> <p>1</p>
Week 7.	<p>Lecture:</p> <p>Introduction to statistical data analysis III (descriptive biostatistical methods): measures of variability</p> <p>Practical:</p> <p>Practical examples on descriptive data analysis – calculation and interpretation of measures of variability</p>	<p>1</p> <p>1</p>
Week 8.	<p>Lecture:</p> <p>Basics of probability, probability and non-probability distributions. Developing and testing of hypothesis. Hypothesis testing errors</p> <p>Practical:</p> <p>Practical examples: mathematical models of probability and non-probability distributions: normal distribution; types of hypotheses in medical research; hypothesis testing errors</p>	<p>1</p> <p>1</p>

Week 9.	Lecture: Statistical inference: estimation	1
	Practical: Practical examples: calculating and interpreting confidence intervals (CI) for sample statistics	1
Week 10.	Lecture: Statistical inference: hypothesis testing – research questions about one group	1
	Short quiz No 2. Practical: Practical examples of analysis of data of one group	1
Week 11.	Lecture: Statistical inference: hypothesis testing – research questions about two or more groups	1
	Practical: Practical examples of analysis of data of two or more groups	1
Week 12.	Lecture: Testing hypotheses on relationship between quantitative variables (regression, correlation)	1
	Practical: Practical examples of quantitative data analysis: regression and correlation I	1
Week 13.	Lecture: Analysis of binary outcomes	1
	Practical: Practical examples of quantitative data analysis: regression and correlation II <i>Submitting seminar work</i>	1
Week 14.	Lecture: Measuring disease occurrence. Demographic and vital statistics	1
	Practical: Practical examples of analysis of binary outcomes	1

Week 15.	Lecture: Presenting the best of students' seminar work <i>Short quiz No 3.</i>	1
	Written exam Practical: Measures of disease occurrence – practical examples of calculation and interpretation	1
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code:MFSE 0406	Course title: HYGIENE		
Level: preclinical	Study year: II	Semester: IV	ECTS: 2
Status: obligatory	Total contact hours: 30		
Prerequisites:	According to the Study Regulation		
Lecturers: Associate Professor Amra Čatović MD PhD			
1. Overall aim	The overall aim of the Hygiene course is to give students a basic understanding of how environmental factors impact the health of people and the community, and of the efforts made to prevent or minimize the effects of negative impacts.		
2. Course contents	<p>The following topics will be covered during the Modules:</p> <ul style="list-style-type: none">• Module 1. Ecology and environment health• Module 2. Exposure assessment, industrial hygiene and environmental management• Module 3. Genetics and environmental health• Module 4. The children's environment and health action plan		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge necessary for understanding how environmental factors can harm human health and how to identify, prevent, and control such effects. They will be able to describe and distinguish human-caused and naturally occurring contaminants in air, water, and soil. They will be able to analyze issues related to phenomena that have the potential to impact public health in a variety of settings: the home, the workplace, the community, the nation, and the world (e.g., climate change). Students will be able to identify potential outcomes of adverse human-environment interactions and to participate in interdisciplinary approach to solve problems addressed to public health issues associated with exposures to environmental contaminants with emphasizes prevention rather than treatment of human illness.</p> <p>Through practical work the students will develop skills for determining the intensity of exposure to contaminants in community, occupational and residential settings. Procedures for interpretation and application of results will be explored, in the context of making decisions regarding the hazard magnitude and choice of methods for control.</p> <p><i>Through the lectures and seminars, the students will gain following knowledge and competences to:</i></p> <ol style="list-style-type: none">1. Explain the linkages between public and ecosystem health and apply the ecosystem approach to the management of an emerging environmental health hazard. Discuss major human health impacts associated with global environmental change.2. Identify the major types and sources of chemical, microbial, and physical contamination of specific media (air, water, soil) and describe fundamental principles by which contamination may impact human health. Explain environmental determinants of health within the population health paradigm.3. Describe basic strategies for assessing, preventing, and controlling or managing health and safety hazards. Explain the theoretical framework which guides environmental health practitioners. Identify potential outcomes of adverse human-environment interactions and assess the measures required to protect the public.4. Able to use library resources and scientific databases. Explain the pertinent scientific principles associated with the major environmental health program areas.		

	<p><i>Through the practical work and seminars students will acquire following skills to:</i></p> <ul style="list-style-type: none"> - Select appropriate sampling methods of exposure monitoring - Demonstrate the application of principles and techniques for sampling air and contaminated surfaces, and drinking water to exposure monitoring - Choose and explain the proper analytical methods to be applied to these samples - Identify and describe the standard published references in environmental sampling and analysis for assessment of human exposure 																						
4. Teaching methods	<p>Lectures: 10 hours Seminars: 10 hours Practical work: 10 hours</p>																						
5. Method of knowledge assessment and examination	<p>Knowledge assessment will be carried out continuous during the semester and as written final exam.</p> <p>Continuous knowledge and skills assessment will be carried out through completing assignments, class participation in discussion groups (Seminars), and Term Project (designed to educate specific group on an environmental health topic).</p> <p>Final exam will consist of 2 parts: test in the form of Multiple choice questions (MCQ) test and Extended response questions (ERQ) test.</p> <p>Final grades will be distributed as follows: Attendance, completing assignments and class participation in discussion groups: 30 points Term Project: 30 points Final Exam: 40 points</p> <p>Final grade will be calculated as a pondered arithmetic mean (i.e. joint arithmetic mean) of all grades given throughout semester.</p> <p>Grading of writing parts of the exam will be performed with respect to rules and regulations of syllabi harmonization of Bologna studying for every single exam term as following:</p> <table border="1"> <thead> <tr> <th>Grade</th><th>No of points</th><th>Grade description</th></tr> </thead> <tbody> <tr> <td>10 (A)</td><td>95-100</td><td>Exceptional with minor errors</td></tr> <tr> <td>9 (B)</td><td>85-94</td><td>Above average with few errors</td></tr> <tr> <td>8 (C)</td><td>75-84</td><td>Average, with noticeable errors</td></tr> <tr> <td>7 (D)</td><td>65-74</td><td>Good, with significant errors</td></tr> <tr> <td>6 (E)</td><td>55-64</td><td>Meets minimal criteria</td></tr> <tr> <td>5 (F, FX)</td><td>< 55</td><td>Fails to meet minimal criteria</td></tr> </tbody> </table>		Grade	No of points	Grade description	10 (A)	95-100	Exceptional with minor errors	9 (B)	85-94	Above average with few errors	8 (C)	75-84	Average, with noticeable errors	7 (D)	65-74	Good, with significant errors	6 (E)	55-64	Meets minimal criteria	5 (F, FX)	< 55	Fails to meet minimal criteria
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6. Literature	<p>Required</p> <ul style="list-style-type: none"> – Frumkin H. Environmental Health: From Global to Local. San Francisco: Jossey-Bass; 2016. 																						
7. Remarks	<p>All proposed teaching types are obligated. In case a student misses more than 10% of classes (excused or not excused) one is obliged to colloquially pass all the missed. Consultation hours are every day 12.00-13.00 with prior announcement by email: amra.catovic@mf.unsa.ba</p>																						

COURSE PLAN: HYGIENE

Days	Form of Instructions and materials	Number of classes
Monday	<u>Lecture:</u> - Ecology and environment health <u>Practical laboratory work:</u> Exposure assessment <u>Seminars:</u> Vector borne disease	2 2 2
Tuesday	<u>Lecture:</u> - Industrial hygiene <u>Practical laboratory work:</u> Environmental sampling and methods for environmental analysis <u>Seminars:</u> The lifelong impact of air pollution	2 2 2
Wednesday	<u>Lecture:</u> - Genetics and environment health <u>Practical laboratory work:</u> Indoor environments <u>Seminars:</u> Energy and radiation	2 2 2
Thursday	<u>Lecture:</u> - Water quality <u>Practical laboratory work:</u> Exposure management <u>Seminars:</u> Environmental exposures and latent disease risk	2 2 2
Friday	<u>Lecture:</u> The children's environment and health action plan <u>Practical laboratory work:</u> Control of mayor environments hazards <u>Seminars:</u> Environmental exposures and neurodevelopmental disorders	2 2 2
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code: MFSE 0407	Course title: Bosnian language 4		
Level: preclinical	Study year: II	Semester: IV	ECTS: 2
Status: obligatory	Total contact hours: 30		
Prerequisites:	According to the Study Regulation		
Lecturers:	Engaged teachers from the core faculty.		
1. Overall aim	The overall aim is to prepare students to understand clear standard speech on familiar topics used in daily situations, in school, at work and during free time. Students will learn to communicate face-to-face and to understand more specific medical vocabulary.		
2. Course contents	Following topics will be covered throughout the lectures: <ul style="list-style-type: none"> - Learn and practice communication in Bosnian language - Medical related information - Reading of selected articles related to medicine - Writing messages and notes - Advanced communication with patients 		
3. Learning outcomes (Knowledge, skills and competences)	<p>Listening: After this course, students will be able to understand phrases and highest frequency vocabulary related to more complex situations in everyday life. Students will acquire the needed knowledge in order to be able to understand more complex information about their field of interest.</p> <p>Reading: Student will learn to read longer and more complex text in Bosnian language, and will be able to find specific information in everyday materials. Students will learn to read and understand more complex book sections.</p> <p>Speaking: Communication on this level is based on exchange of extended and more multiplex information on familiar topics and activities. They will learn to lead a simple and short conversation, which includes a simulation of the basic patient-doctor communication.</p> <p>Writing: Students will learn to write longer and more compound notes, letters intake papers etc.</p> <p>Grammar: Students are expected to achieve a corresponding level of important and more complex Bosnian grammatical structures, and to enhance their communication skills by learning specific medical vocabulary and grammatical constructions.</p>		
4. Teaching methods	The course is performed in form of Lectures (15) Practical works (15)		

5. Methods of knowledge assessment and examination	<p>EXAM</p> <p>3. Mid-term exam (8. week)</p> <p>4. Final exam (after the course)</p>
6. Literature	<p>1. Midhat Riđanović, Bosnian for Foreigners, Spirit of Bosnia Volume 7 No. 3 (2012) (selected parts)</p> <p>2. Minela Kerla i Nermina Alihodžić-Usejnovski, Bosanski jezik: komunikacijski priručnik za strance sa zadacima i vježbama, Sarajevo, 2013 (selected parts)</p> <p>3. English-Bosnian dictionary upon own choice</p> <p>4. Selected newspaper articles and medicine books abstracts selected by the teacher</p>
7. Remarks	<p>Student office hours are published on the faculty website. Pre-agreed consultations are obligatory, and can be scheduled via e-mail: studentska.sluzba@mf.unsa.ba</p>

BOSNIAN LANGUAGE IV
Implementation plan

Week	Teaching method and materials	Number of hours
Week 1.	Lecture: Introduction to conditional. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 2.	Lecture: Relative pronouns. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 3.	Lecture: Word order. Placing clitics. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 4.	Lecture: Perfective and imperfective verbs. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 5.	Lecture: Introduction to passives. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 6.	Lecture: Collective nouns. Pluralia tantum nouns. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 7.	Lecture: I-declination nouns. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 8.	MIDTERM EXAM	2
Week 9.	Lecture: Comparison of adjectives. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 10.	Lecture: Compound pronouns. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 11.	Lecture: Numbers.	1

	Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1
Week 12.	Lecture: Conditional. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 13.	Lecture: Word order. Discourse word order. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week14.	Lecture: Impersonal sentences. Practical work: Grammar practice. Speaking and writing exercises. Vocabulary.	1 1
Week 15.	Lecture: Recapitulation of the learned grammar. Practical work: Spontaneous conversation. Speaking and writing exercises.	1 1
Week 17.-.18.	Final exam (regular term)	2
Week 19.-20.	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code:MSFE 0407	Course title: Integrative Systems of Human Body		
Level: preclinical	Study year: II	Semester: IV	ECTS: 1
Status: elective	Total contact hours: 20		
Prerequisites:	According to the study regulations		
Lecturers:Assistant Professor AminaValjevac MD PhD			
1. Overall aim	The overall aim of the course Integrative Systems of Human Body is to introduce medical students with basic physiological mechanisms of neuroendocrine control involved in complex responses of human body and its adaptation to various conditions in the internal and the external environment.		
2. Course contents	The course content will be realized through following Modules Module 1. Integrative Systems of Human Body Module 2. Stress Module 3. Pregnancy and labor Module 4. Endocrine functions of adipose tissue and regulation of food intake Module 5. Neuroendocrine response to high and low environment temperature		
2. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge about integrative systems of human body and their important roles in adaptation to various changes in the internal and the external environment.</p> <p>Students will also learn about different teaching and learning methods, e-learning and problem based learning (PBL) and develops skills for individual and team works in solving physiological and medical problems based on knowledge acquired during preclinical education and improves student’s capacity for critical thinking.</p> <p>Through lectures and seminars and PBL session the students will gain following knowledge and competences:</p> <ol style="list-style-type: none">1. Basic knowledge about functional organization of autonomic nervous and endocrine system, as a part of integrative systems of human body, and their interrelationships.2. The neuroendocrine integration in response to various kinds of stress.3. The morphological and functional physiological changes during human pregnancy and neuroendocrine integration in response to these changes.4. Endocrine functions of non-endocrine tissue, the endocrine functions of adipose tissue and regulation of food intake5. Knowledge of the human body’s reaction to changed environmental conditions, high and low temperature. <p><i>Through the practical laboratory work, students will acquire following skills:</i></p> <ul style="list-style-type: none">- Implementation of modern in formation technologies and e-contents- Searching for information, critical selection and correctly use of the relevant information in solving physiological and medical problems- Communication skills improvement and ability for team work- Development of critical thinking		
4. Teaching methods	PBL sessions: 6 hours e-learning – PBL on- line 6 hours Lectures: 4 hours Seminars: 4 hours		
5. Method of knowledge assessment and examination	Oral presentation and discussion during each PBL session and seminars and individual activities at on-line PBL session will be assessed continuously.		
6. Literature			

	<ul style="list-style-type: none"> – Recommended: – Silverthorn D. U. Human Physiology: An Integrated Approach (6th Edition). Pearson; 2012 <p>Additional:</p> <ul style="list-style-type: none"> - Hall J. E. Guyton and Hall Textbook of Medical Physiology, 12th Edition. Elsevier Saunders; 2010
7 Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: fiziologija@mf.unsa.ba</p>

COURSE PLAN: Integrative Systems of Human Body

Weeks	Form of Instructions and materials	Number of classes
Week 1.	Lecture: Integrative physiology, conceptual maps and flow charts	1
Week 2.	Lecture: Principles of PBL-an overview	1
Week 3.	PBL session: Stress related case studies; introduction to cases, literature search and discussion	2
Week 4.		
Week 5.	PBL sessions: Stress related case studies; group presentation	2
Week 6.	PBL session: Neuroendocrine responses related case studies: introduction to cases, literature search and discussion	2
Week 7.		
Week 8.	PBL session: Neuroendocrine responses related case studies: group presentation	2
Week 9.	Lecture: Neuroendocrine role of Adipose tissue, food intake control	2
Week 10.	PBL session: Adipose tissue, adipokines and obesity related case studies: introduction to cases, literature search and discussion	2
Week 11.		
Week 12.	PBL session: Adipose tissue, Adipokine and obesity related case studies: group presentation	2
Week 13.		
Week 14.	Seminar: Pregnancy and labor	2
Week 15.	Seminar: Partial exam - PBL	2
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code: MFSE 0408	Course title: NEUROENDOCRINE REGULATION OF BONE REMODELING		
Level: preclinical	Study year: II	Semester: IV	ECTS: 1
Status: elective	Total contact hours: 20		
Prerequisites:	According to the study regulations		
Lecturers: Assistant Professor Amina Valjevac MD PhD,			
1. Overall aim	The overall aim of the Neuroendocrine Regulation of Bone Remodeling course is to increase understanding of the physiological mechanisms which regulate bone remodeling from molecular level to organ systems and that the assessment of bone remodeling process requires integrative approach.		
2. Course contents	The following topics will be covered within the Modules: Module 1. Bone remodeling process Module 2. Functional assessment of bone remodeling rate Module 3. Adipose tissue and bone remodeling Module 4. Age-related changes in bone remodeling rate Module 5. Reproductive hormones and bone remodeling		
6. Learning outcomes (Knowledge, skills and competences)	Students will acquire knowledge necessary for understanding the normal process of bone remodeling. Through practical work the students will understand the task of defining key words in search for literature, proper selection of the available information through critical approach and adequate presentation of the findings from a given field. <i>Through the lectures and seminars, the students will gain following knowledge and competences:</i> <ol style="list-style-type: none">1. Learn the structure and function of bone tissue, stages and regulation of bone remodeling.2. Discover methods for assessment of bone remodeling including bone turnover markers, clinical relevance and limitations of diagnostic methods in assessing the status of the skeletal system.3. Discover adipobone axis and gain the insights in the role of adipose tissue hormones in bone remodeling.4. Learn that the rate of bone remodeling and bone metabolism is influenced by the age.5. Gain the insights in bone remodeling process during the postmenopausal period.6. Learn that the ability to predict changes in bone remodeling requires an integrative approach.7. Learn that the correct interpretation of the bone turnover rate requires interdisciplinary approach.8. Learn that the proper and critical search of available literature is the key in finding required information from a particular medical field.		

	<p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> – Assessment of bone remodeling rate – Interpretation of the bone turnover markers – Defining the keywords necessary to find relevant information – Searching relevant databases and select the required information – Critical choice and adequate presentation of relevant information on the given field
4. Teaching methods	<p>Lectures: 7 hours Seminars: 4 hours Laboratory practical work: 9 hours</p>
7. Method of knowledge assessment and examination	<ul style="list-style-type: none"> - Written test in the form of Extended response questions (ERQ) and - Oral examination through group discussion and presentation <p>Continuous knowledge and skills assessment will be carried out through Partial exam, Seminars and Practical laboratory Colloquium.</p>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> – Hall JE. Guyton and Hall Textbook of Medical Physiology. 12th edition, Elsevier Saunders; 2010. – Valjevac A. The role of leptin and adiponectin in bone remodeling process in postmenopausal females with osteoporosis. Doctoral thesis, Medical Faculty University of Sarajevo; 2013. <p>Additional:</p> <ul style="list-style-type: none"> – Boron and Boulpaep. Medical Physiology. 2nd edition. Saunders (Elsevier); 2009.
7 Remarks	<p>Student office hours are published in a separate schedule which can be found on the Department's notice-board and on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: fiziologija@mf.unsa.ba</p>

COURSE PLAN: Neuroendocrine Regulation of Bone Remodeling

Weeks	Form of Instructions and materials	Number of classes
Week 1.	Lecture: Bone metabolism and physiology of bone remodeling. Osteoclasts and osteoblasts.	2
Week 2.	Lecture: Local factors regulating bone remodeling. RANK-RANKL-osteoprotegerin system Principles of searching medical literature.	2
Week 3.	Lecture: Evaluation of bone remodeling, Bone turnover markers and their interpretation in clinical practice.	2
Week 4.	Lecture: Bone-adipose axis	1
Week 5.	Practical: Small research project: Literature search and discussion on the subject: "Adipokines and bone remodeling"	2
Week 6.		
Week 7.	Practical: Small research project: Presentation of the search results on the subject: "Adipokines and bone remodeling."	2
Week 8.	Practical: Small research project: Literature search on the subject: "Age related changes in bone remodeling – the role of calcium, parathyroid hormones and Vitamin D"	1
Week 9.	Practical: Small research project: Discussion on the subject: "Age related changes in bone remodeling – the role of calcium, parathyroid hormones and Vitamin D"	2
Week 10.		
Week 11.	Seminar: The role of physical activity in bone remodeling	2
Week 12.		
Week 13.	Practical: Small research project: Presentation of the search results on the subject: "Age related changes in bone remodeling – the role of calcium, parathyroid hormone and Vitamin D."	2
Week 14.		
Week 15.	Seminar: Partial exam	2
Weeks. 17/18	Final exam (regular term)	
Weeks 19/20	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code: MFSE 0410	Course Title: DESPITE ALL – WE ARE ALKALINE		
Level: preclinical	Study year: II	Semester: III	ECTS: 1
Status: elective	Total contact hours: 20		
Prerequisites:	According to the Study regulation		
Lecturers: Associate Professor Radivoj Jadrić MD PhD, Associate Professor Sabaheta Hasić MD PhD, Associate Professor Emina Kiseljaković MD PhD, Assistant Lejla Alić MD, Assistant Amila Kulo MD			
1. Course aim	The aim of the Despite all – We are Alkaline Course is improve knowledge about acid-base homeostatic mechanisms, its disorders and regulation.		
2. Course contents	<p>The following topics will be covered within the Module</p> <p>Module 1. Maintaining of body hydrogen ions concentration Aim: To acquire knowledge of pH regulation and buffer system in human organism</p> <p>Module 2. Regulation of acid-base balance in certain pathological conditions and interpretation of numerous acid-base balance disorders Aim: To acquire knowledge of acid–base status regulation in certain pathological conditions (uremia, diabetes, etc.)</p> <p>Module 3. The analytical procedures used in the assessment of acid-base status Aim: To acquire knowledge of acid–base status evaluation using analytical procedures</p>		
3. Learning outcomes (Knowledge, competences and skills)	<p>Students will acquire knowledge necessary for understanding mechanisms of maintenance, regulation and disorders of acid-base balance in human organism. They will be able to integrate obtained knowledge from Medical biochemistry, with analytical procedures used in clinical practice.</p> <p><i>Through the lectures students will gain following knowledge and competences:</i></p> <ul style="list-style-type: none">– Learn the mechanisms of maintaining body hydrogen ions concentrations within a narrow range as well as importance of buffering systems– Discover the principles of acid-base balance regulation in certain pathological conditions (uremia, diabetes mellitus, etc.).– Understand principles of laboratory procedures and interpretation of obtained results– Evaluation of the ABS in patients– Differentiation of primary and secondary changes of acid-base status <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none">– Measurement of pH value using instruments (pH meter), test strips, colorimetric– Testing buffer systems in vitro and determination of buffer capacity– Calculation of pH based on known parameters (conc. HCO₃⁻, pCO₂)		
4. Teaching methods	Lectures: 10 hours Laboratory practical work: 10 hours		
5. Method of knowledge assessment and examination	Continuous assessment of knowledge (Midterm examination) will be carried out through practical exam (colloquium) and partial exam. During any form of knowledge assessment, the student will attain certain number of points with an obligatory minimum of 55% to pass the test successfully.		

Partial exam

Topics contained in three modules will be assessed through partial exam in a form of test. Test consists of 30 MCQ. Each correctly answered question receives 2 points. Minimum percentage of correctly answered questions needed to pass the test is 55%.

Practical exam (colloquium)

Laboratory practical work will be based on the principle of interactive learning, where the student is obliged to prepare the lectures in advance. Continuous knowledge assessment will be carried out with colloquium. The student draws a card with one question. Each question corresponds to one topic within the practical work (in total five topics). The student writes an essay on the topic from the card where following parts are evaluated:

- Student describes the assigned topic (5 points)
- Student describes the significance of the assigned topic (5 points)
- Student describes appliances needed to carry out the reaction (5 points)
- Student describes accessories needed to carry out the reaction (5 points)
- Student describes reagents needed to carry out the reaction (5 points)
- Students describes analytical procedure (5 points)
- Student is able to perform practical work (5 points)
- Students is able to interpret the results and reference range (5 points)

Minimum points needed to pass the practical exam is 23 points, maximum score is 40 points.

Students who have successfully accomplished all of their obligations during the semester (attendance is within the legal limits) and who have passed all the necessary exams of the course (attained minimum score of 55%) are not required to take Regular exam. Their final grade is reported according to points attained during Continuous knowledge assessment.

Regular examination term

Previously defined criteria will be applied also in Regular examination term.

Re-sit examination term /September examination term

Previously defined criteria will be applied also in Re-sit and September examination terms.

	<p>Grading system and grading points</p> <p>Final grade is reported according to points attained during both forms of the knowledge assessment (practical and theoretical exams).</p> <table><tr><th>Grade</th><th>Total score (points)</th><th>Grade description</th></tr><tr><td>10 (A)</td><td>95-100</td><td>Outstanding results without errors or with minor errors</td></tr><tr><td>9 (B)</td><td>85-94</td><td>Above average, with some mistakes</td></tr><tr><td>8 (C)</td><td>75-84</td><td>Average, with noticeable mistakes</td></tr><tr><td>7 (D)</td><td>65-74</td><td>Generally good, but with significant mistakes</td></tr><tr><td>6 (E)</td><td>55-64</td><td>Meets the minimum criteria</td></tr><tr><td>5 (F, FX)</td><td><55</td><td>Does not meet the minimum criteria</td></tr></table>	Grade	Total score (points)	Grade description	10 (A)	95-100	Outstanding results without errors or with minor errors	9 (B)	85-94	Above average, with some mistakes	8 (C)	75-84	Average, with noticeable mistakes	7 (D)	65-74	Generally good, but with significant mistakes	6 (E)	55-64	Meets the minimum criteria	5 (F, FX)	<55	Does not meet the minimum criteria
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6 (E)	55-64	Meets the minimum criteria																				
5 (F, FX)	<55	Does not meet the minimum criteria																				
6. Literature	<p>Required:</p> <p>1. Teaching materials written by Medical Biochemistry personnel.</p> <p>Recommended:</p> <p>1. Bhagavan NV. Medical Biochemistry. 4th ed. Harcourt/Academic Press; 2002</p> <p>2. Zilva JF, Pannall PR, Mayne PD. Clinical Chemistry in diagnosis and treatment, 6th ed. CRC Press; 1994</p>																					
7. Remarks	<p>All forms of lectures and practical laboratory work are mandatory. Student attendance is regulated by the Law of Higher Education of Sarajevo Canton. Student absence should be justified by valid documentation. Lectures and laboratory practical work will be held at the Department of Medical Biochemistry.</p> <p>Department of Medical Biochemistry Consultation: each working day: 1-2 p.m. at the Department of Medical Biochemistry or via e-mail radivoj.jadric@mf.unsa.ba</p>																					

COURSE PLAN: DESPITE ALL – WE ARE ALKALINE

Week	Teaching method and topics	Hours
Day 1	Lecture: pH and pleomorphism; dysbiosis and pH; nutrition and pH – the way we become "acidic"; pH of dental plaque – significance of carbonic anhydrase Practical laboratory work: Titration of buffer systems <i>in vitro</i>	3 2
Day 2	Lecture: pH buffers in blood – hydrogen carbonate, phosphate/ammoniacal, protein buffer; electrolytes as buffers, buffer-like acting hormones, LDL or fat as buffers; development of latent acidosis, consequences of acidification; elimination of ammonia in different vertebrates Practical laboratory work: pH measurement in liquids (colorimetric, pH-meters)	2 2
Day 3	Lecture: Compensation of acid-base status disorder; combined disorders acid-base status. Analytical procedures used to assess acid-base status - Boston approach Practical laboratory work: pH measurement of saliva and urine using indicator strips; determination of carbonic anhydrase activity.	2 2
Day 4	Lecture: Challenges of pH determination – change of values in saliva and urine; base excess and anion gap Practical laboratory work: Analysis of acid-base balance disorders	2 2
Day 5	Partial exam	3
Week 17–18	Final exam (regular term)	
Week 19–20	Final exam (make-up examination term)	
September	Final exam (September examination term)	

Code: MFSE 0411		Course title: Introduction to Practical Epidemiology	
Level: preclinical	Study year: II	Semester: IV	ECTS: 1
Status: elective	Total contact hours: 20		
Prerequisites:	According to study regulation		
Lecturers: Prof. Semra Čavaljuga, MD, MSc, DSc; senior assistant Enisa Ademović, MD, MSc., senior assistant Lejla Džananović, MD, MSc.			
1. Overall aim	Students should, at the beginning of their medical education, familiarize themselves with practical, field work on epidemiological research. They will master data collection on their own as well as descriptive analysis of simple research in order to better understand scientific literature data. They will master how to perform a practical field research, know a research subject, analyze data collected and present results of own research.		
2. Course objectives	Students will master the elements and methods of field data collection, basics of descriptive data analysis and practical aspects of field research.		
3. Learning outcomes (Knowledge, skills and competences)	Students should master the following knowledge:		
	<p>Module 1. Introduction to field / practical epidemiology Students should master the basics of field epidemiologic research, as well as methods, definitions and elements of practical epidemiology and its place in medical theory and practice. They will be presented with basics determinants of physical, biological, demographic, ecological and social-economic effects on population's health and disease.</p> <p>Module 2. Field research design Students should master the appropriate choice of descriptive epidemiological study with objectives and hypotheses, basics in literature search and design of a descriptive research.</p> <p>Module 3. Practical aspects in descriptive epidemiology</p> <p>3.1 Practical data collection with data organization 3.2 Methods of literature search 3.3 Sampling in practice 3.4 Questionnaire design 3.5 Biases/errors, types of bias</p> <p>Students should familiarize themselves with the organization of an epidemiological field research, master the types and methods of data collection, basics of literature search, sampling methods, and questionnaire design on practical examples.</p> <p>Module 4. Application of statistical data analysis in field / practical epidemiology</p> <p>4.1 Tabular and graphic presentation of data collected and results 4.2 Descriptive data analysis 4.3 Results interpretation and analysis of a chosen study 4.4 Representativeness of results 4.5 Pros and limitations of descriptive studies</p> <p>Students should master the basic elements of correct tabular and graphic presentation of own data, and basic methods of descriptive data and results analysis, through the analysis of a real research.</p>		

	<p>Module 5. Data and results presentation Students should master the rules of appropriate data and results presentation.</p> <p>Knowledge a student should master after the completion of this course:</p> <ol style="list-style-type: none"> 1. Know how to design a simple practical field research 2. Know basics in literature search and how to collect data by own research 3. Know basics in sampling methods (simple, stratified) and how to choose a representative sample 4. Master methods of descriptive data analysis of simple descriptive research <p>Students should master the following skills and competencies:</p> <ol style="list-style-type: none"> 1. Questionnaire design for a specific study 2. Types of descriptive epidemiological studies 3. Know differences and relations between specific types of descriptive studies 4. Identify basic effects of physical, biological, demographic, ecological and social-economic health and disease determinants in B&H 5. Analyze the results of descriptive epidemiological studies. <p>Attitudes a student should master after the completion of this course:</p> <ol style="list-style-type: none"> 1. Knowing basic field epidemiology methods and elements facilitates the understanding of literature data and helps in everyday medical theory and practice 2. There are various types of errors / biases in field research which can be avoided. 3. Knowing how to choose an appropriate epidemiological study makes study results relevant 4. Only field research with appropriate methodology produces scientifically valid and practically applicable results 5. Knowing pros and limitations of descriptive epidemiological studies results in appropriate application of descriptive epidemiology in medical practice. 						
4. Teaching methods	<p>In semester, there will be total of:</p> <ul style="list-style-type: none"> – 8 hours of lectures; – 6 hours of laboratory sessions / contact with TAs – 6 hours of seminar classes 						
5. Method of knowledge assessment and examination	<p>Grading will be performed by points given for every part of the studying activity and knowledge testing during the semester and on the final exam, by the following structure:</p> <table> <tr> <td>– activity during classes</td> <td>10% of the final grade</td> </tr> <tr> <td>– seminar paper</td> <td>60% of the final grade</td> </tr> <tr> <td>– seminar paper presentation with questions answering during the presentation</td> <td>30% of the final grade</td> </tr> </table> <p>Final grade will be calculated as a pondered arithmetic mean of all grades given throughout semester (i.e. joint arithmetic mean).</p>	– activity during classes	10% of the final grade	– seminar paper	60% of the final grade	– seminar paper presentation with questions answering during the presentation	30% of the final grade
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– seminar paper	60% of the final grade						
– seminar paper presentation with questions answering during the presentation	30% of the final grade						

	<p>Grading of written parts of the exam will be performed with respect to rules and regulations of syllabi harmonization of Bologna studying for every single exam term as following.</p> <table><tr><th>Grade</th><th>No of points</th><th>Grade description</th></tr><tr><td>10 (A)</td><td>95-100</td><td>Exceptional with minor errors</td></tr><tr><td>9 (B)</td><td>85-94</td><td>Above average with few errors</td></tr><tr><td>8 (C)</td><td>75-84</td><td>Average, with noticeable errors</td></tr><tr><td>7 (D)</td><td>65-74</td><td>Good, with significant errors</td></tr><tr><td>6 (E)</td><td>55-64</td><td>Meets minimal criteria</td></tr><tr><td>5 (F, FX)</td><td>< 55</td><td>Fails to meet minimal criteria</td></tr></table> <p><u><i>In order to be given a passing final grade, student must obtain a passing grade from all forms of knowledge testing.</i></u></p>	Grade	No of points	Grade description	10 (A)	95-100	Exceptional with minor errors	9 (B)	85-94	Above average with few errors	8 (C)	75-84	Average, with noticeable errors	7 (D)	65-74	Good, with significant errors	6 (E)	55-64	Meets minimal criteria	5 (F, FX)	< 55	Fails to meet minimal criteria
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6 (E)	55-64	Meets minimal criteria																				
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6. Literature	<p>Required:</p> <ul style="list-style-type: none">- R. Beaglehole, R. Bonita, T. Kjellstrom. Basic Epidemiology. World Health Organisation. Geneva, 1993. <p>Additional:</p> <p><i>(This literature might be helpful to the students who have Bosnian language skills)</i></p> <ul style="list-style-type: none">- Z. Radovanović. Terenska epidemiologija. Medicinski fakultet Univerziteta u Beogradu. 2000.- S. Čavaljuga. Osnovi moderne epidemiologije: nadzor i istraživanje epidemija – in preparation																					
7. Remarks:	<p>It is forbidden to bring unauthorized copies of literature to classes!</p> <p>Maximum number of students for this course is 50!</p> <p>Seminar paper must be submitted at least 5 days before the day of presentation, with a Power-Point presentation.</p> <p>Consultation hours are every day 08.30-10.00 and 13.00-14.30 with prior announcement to the Department's Secretary or by email: epidemiologija@mf.unsa.ba</p>																					

COURSE PLAN: INTRODUCTION TO PRACTICAL EPIDEMIOLOGY

Weeks	Form of Instructions and materials	Number of classes
Week 1	Lecture: Introduction to field/practical epidemiology	2
Week 2	Lecture: Golden lecture on prevention – part I	2
Week 3	Lecture: Golden lecture on prevention – part II Practical: Browsing literature according to research topic	1 1
Week 4	Lecture: Descriptive epidemiological studies – how to develop an epidemiologic research question Practical: Designing a simple practical field research – I	1 1
Week 5	Lecture: How to state an objective of epidemiological research, discussing topics for a simple practical field of research. Practical: Designing a simple practical field research – II	1 1
Week 6	Seminar work: Designing a simple practical field research. Adequate sampling method and questionnaire design for the given research topic	2
Week 7	Seminar work: Presenting aims, samples and questionnaires for the designed research in groups, discussion.	2
Weeks 8 – 11	(STUDENTS WORK INDEPENDENTLY – USUAL CONSULTING HOURS AT TEACHING ASSISTANTS' OFFICES IN WEEK 10th AND 11th) Field work: Collecting data for the field research	
Week 12	Practical: Elaborating methods of statistical data analysis on field research examples	1
Week 13	Lecture: Tables and graphical data presentation of descriptive data Practical: Analyzing descriptive data (tutoring groups of students)	1 1
Week 14	Seminar work: Finalizing research/seminar work reports	1

	Practical: Analyzing descriptive data (tutoring groups of students)	1
Week 15	Seminar work: Presenting seminar works, answering the teachers' questions – examination	1
Week 17.-18.	Final exam (regular term)	
Weeks 19.-20.	Final exam (make-up examination term)	
September	Final exam (September examination term)	

