

**MFSE THIRD YEAR**

### THIRD YEAR

FIFTH (WINTER) SEMESTER						
Code	Course Title	L	P	S	TCH	ECTS
MFSE 0501	Pathology 1	60	45	15	120	9
MFSE 0502	Patophysiology 1	30	30	15	75	5
MFSE 0503	Pharmacology and Toxicology 1	32	26	22	80	5
MFSE 0504	Medical Microbiology 1	30	30		60	4
MFSE 0505	Epidemiology	29	29	2	60	4
MFSE 0506	Molecular Medicine	12	18		30	2
MFSE 0507-0510	Elective Course 1	10	10		20	1
	TOTAL	203	215	54	445	30

#### Elective courses:

**MFSE 0507** Role of the Respiratory Chain

**MFSE 0508** Doping and Anti-Doping

**MFSE 0509** Diagnostic laboratory procedures in Pathology

**MFSE 0510** Food Safety and Health

Code: <b>MFSE 0501</b>	Course title: <b>PATHOLOGY 1</b>		
Level: <b>Preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS : <b>9</b>
Status: <b>Obligatory</b>	Weeks: <b>15</b>		Total contact hours: <b>120</b>
Prerequisites:	<b>According to the Study Regulation</b>		
Lecturers: <b>Svjetlana Radović, MD, PhD, professor of pathology</b> <b>Suada Kuskunović-Vlahovljak, MD, PhD, assistant professor of pathology</b> <b>Edina LazovićSalčin, MD, PhD, assistant professor of pathology</b> <b>Nina Čamdžić, MD, teaching assistant</b>			
1. Overall aim	The overall aim of the Pathology 1 course is to provide knowledge about general principles of pathology including mechanisms of cells, tissues and organs damage and to introduce morphological and molecular changes that are basis to the disease or which appear because of the disease.		
2. Course contents	The following topics will be covered during the modules:  <b>Module 1. Cell pathology</b> <b>Module 2. Hemodynamic disorders and shock</b> <b>Module 3. Inflammation and tissue repair</b> <b>Module 4. Environmental diseases</b> <b>Module 5. Immunopathology</b> <b>Module 6. Genetic and developmental diseases</b> <b>Module 7. Tumor pathology</b>		
3. Learning outcomes (knowledge, skills and competence)	<p>The task of the Course is to enable the students to recognize morphological changes in cells, tissues and organs, based on the acquired theoretical knowledge and seminars, as well as to gain their own experience analyzing macroscopic specimens and microscopic tissue samples.</p> <p>The acquired knowledge and skills should enable better understanding causes and mechanisms of disease and to facilitate gaining knowledge of the functional consequences of the morphological changes.</p> <p>The task of Pathology 1, as a clinical-theoretical subject, is to connect the previous basic study courses, studying structure and function of normal human body, with clinical disciplines.</p> <p><i>Through the Pathology 1 course students will gain following <b>knowledge</b> and ability to <b>recognize</b>:</i></p> <p><b>Module 1. Cell pathology</b> Basic pathological changes on cellular and subcellular level with cell damage morphology, cell adjustment to growth and differentiation with developmental forms of pathological changes as well;</p> <p><b>Module 2. Hemodynamic disorders and shock</b></p>		

	<p>Disorders of body fluids, their etiopathogenesis, morphological changes and consequences;</p> <p><b>Module 3. Inflammation and tissue repair</b>          Biochemical events, outcome and morphological form of acute and chronic inflammation, chemical mediators, the body's response to the infection and manners of tissue repair;</p> <p><b>Module 4. Environmental diseases</b>          Diseases as the result of environmental factors and defence response of the host;</p> <p><b>Module 5. Immunopathology</b>          Disorders of the immune system and mechanisms of their generating, as well as diseases which are their consequences;</p> <p><b>Module 6. Genetic and developmental diseases</b>          The most common teratogenic factors which lead to different malformations, the morphology of malformations that appear during intrauterine fetal growth as well as genetic and chromosomal diseases;</p> <p><b>Module 7. Tumor pathology</b>          Ethiological, morphological, clinical and laboratory characteristics of malignancies as well as their classification.</p> <p><i>Through the lectures of above listed modules and practical work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>- Microscopic level identification and recognition of pathological changes;</li> <li>- Macroscopic observation, identification and recognition of pathological changes;</li> <li>- To apply visible pathological changes from general pathology to any organic system;</li> <li>- To discover the essences of pathological processes, etiology, morphology and clinical features in the most common diseases;</li> <li>- Proper manner of packing and transporting biopsy samples, writing referring form and necessary patients clinical data for biopsy tissue sample;</li> <li>- The recognition and appreciation that each organ system is not equally affected by certain pathological process;</li> <li>- The recognition that the clinical characteristics of certain pathology process are individually different;</li> <li>- The pathology is a clinical science as well, within other clinical specialities;</li> </ul>
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	<p>- Histopathologic reports are used for treatment and prognosis of disease.</p>
4. Teaching methods:	<p><b>Lectures: 60 hours</b>  <b>Seminars:15 hours</b>  <b>Practical work: 45 hours</b></p>
5. Methods of knowledge assessment and examination	<p>Knowledge and skills are evaluated continuously during the semester. Students are required to take a part in all forms of evaluation during the semester.</p> <p><b>Histopathology examination - Pathology 1</b>  The evaluation scale has a maximum of <b>10 points</b>. Minimal requirement for completing this part of exam is scored <b>6 points</b>. The student gets 5 microscopic slides; each is worth 2 points. Student needs to recognize the lesion, write the correct diagnosis in Latin and correctly describe the morphological changes.</p> <p><b>Autopsy</b>  Grading scale has a maximum of <b>10 points</b>, and the minimum criteria for a successful evaluation is <b>6 points</b>. Student gets 5 essay questions. Each question is worth <b>2 points</b>.</p> <p><b>Partial exam 1 (M 1-3)</b>  Partial exam 1 is designed as an essay. The grading scale has a maximum of <b>30 points</b>. To pass the exam, the student must meet the minimum criteria and score <b>16.5 points</b>. The essay has 3 questions which comprise topics from Modules 1-3. Since each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) for each question.</p> <p><b>Partial exam 2 (M 4-7)</b>  Partial exam 2 is designed as an essay. The grading scale has a maximum of <b>50 points</b>. To pass the exam student must meet minimal criteria by scoring <b>27.5 points</b>. The exam is consisted of 5 questions, including material from Modules 4-7. Each question is worth <b>10 points</b>. It is necessary to give a positive answer (minimum of 5.5 points) for each question.</p> <p><b>Final exam</b>  If the student did not complete one of the forms of continued evaluation during the semester, the same takes in final exam as it follows:</p> <ul style="list-style-type: none"> <li>• <b>5 microscopic slides for histopathology examination</b>, each worth 2 points with maximum score of 10 points. Minimal requirement for completing this part of exam is 6 points. The student needs to recognize the lesion, write the correct diagnosis in Latin and correctly describe the morphological changes.</li> </ul>

- **5 essay questions for autopsy module**, each worth 2 points. Grading scale has a maximum of 10 points, and the minimum criteria for a successful evaluation is 6 points.
- **3 essay questions for Module 1-3(M1-3)**, each worth 10 points. The grading scale has a maximum of 30 points. To pass the exam student must meet minimal criteria by scoring 16.5 points. Since each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) on each question.
- **5 essay questions for Module 4-7 (M4-7)**, each worth 10 points. The grading scale has a maximum of 50 points. To pass the exam student must meet minimal criteria by scoring 27.5 points. As each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) on each question.
- **8 essay questions for Module 1-7 (M1-7)** - if the student did not complete partial exam 1 and 2. Each question is worth 10 points. The grading scale has a maximum of 80 points. To pass the exam student must meet minimal criteria by scoring 44 points. As each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) on each question.

**NOTE:** For student who did not complete partial exams, final exam is integral, i.e. failure in one segment is eliminatory.

Final exam is in written form. Students who are dissatisfied with gained number of points during the continuous examination can also take the final exam.

#### **Re-sit/Repeated exam**

Re-sit/Repeated exam is in written form. The repeated exam takes place according to the previously defined criteria of the final exam (referring to the number of questions for the autopsy technique, the number of questions per module and scoring systems for individual segments of the written exam).

Final grade is determined based on the following criteria:

Grade	Cumulative points	Definition
10 (A)	95-100	Outstanding performance with only minor errors
9 (B)	85-94	Above the average standard but with some errors
8 (C)	75-84	Average, with noticeable errors

	7 (D)	65-74	Fair but with significant shortcomings
	6 (E)	55-64	Performance meets the minimum criteria
	5 (F, FX)	<55	Fail (some/considerable further work is required)
6. Literature:	<b>Obligatory:</b> <ul style="list-style-type: none"> <li>– Kumar V, Abbas AK, Aster JC. Robbins &amp; Cotran Pathologic Basis of Disease, 9th ed. Elsevier; 2015.</li> <li>– Kuskunović-Vlahovljak S, Dorić M, Babić M, Lazović-Salčin E, Čamdžić N, Radović S. Histopathology text book with color atlas for medical students. School of Medicine University of Sarajevo; 2017.</li> </ul> <b>Recommended:</b> <ul style="list-style-type: none"> <li>– Klatt EC. Robbins and Cotran Atlas of Pathology, 3<sup>rd</sup> ed. Elsevier Saunders; 2014.</li> <li>– Damjanov I. Pathology for the health professions, 5<sup>th</sup> ed. Elsevier Saunders; 2016.</li> </ul>		
7. Remarks	Consultations with teaching personnel are possible every working day. 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: <a href="mailto:patologija@mf.unsa.ba">patologija@mf.unsa.ba</a>		

## COURSE PLAN: PATHOLOGY 1

Week	Form of teaching	Hours
Week 1.	<p><b>Lecture:</b> Introduction to pathology; term cellular pathology, the cell injury and cell adaptation mechanisms (atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia)</p> <p><b>Seminar:</b> The cell adaptation mechanisms;</p> <p><b>Practical work: Histopathology Exercise 1:</b> Cellular and extracellular disorders</p> <p><b>Autopsy and autopsy technique</b></p>	<p>4</p> <p>1</p> <p>2</p> <p>1</p>
Week 2.	<p><b>Lecture:</b> Cell death mechanisms; Disorders of cell organelles (ER, Lysosomes, mitochondria); cell aging mechanisms</p> <p><b>Seminar:</b> Cellular-based disorders;</p> <p><b>Practical work: Histopathology Exercise 2:</b> Cellular and extracellular disorders</p> <p><b>Autopsy and autopsy technique</b></p>	<p>4</p> <p>1</p> <p>2</p> <p>1</p>
Week 3.	<p><b>Lecture:</b> Hemodynamic disorders and shock; Hemorrhage (types and etiology; clinical approach to hemorrhage); Hemorrhagic syndrome; hyperemia and congestion Tissue ischemia; Infarction (etiology, risk factors, types, morphology of infarct); clinical presentation</p> <p><b>Seminar:</b> Tissue ischemia;</p> <p><b>Practical work: Histopathology Exercise 3:</b> Pigment disorders</p> <p><b>Autopsy and autopsy technique</b></p>	<p>4</p> <p>1</p> <p>2</p> <p>1</p>
Week 4.	<p><b>Lecture:</b> Thrombosis, DIC, Embolism (pulmonary and systemic), shock (etiology and pathogenesis)</p> <p><b>Seminar:</b> Shock - its morphology and clinical presentation;</p> <p><b>Practical work: Histopathology Exercise 4:</b> Hemodynamic disorders</p> <p><b>Autopsy and autopsy technique</b></p>	<p>4</p> <p>1</p> <p>2</p> <p>1</p>



Week 5.	<p><b>Lecture:</b> Overview of inflammation and tissue repair; Acute inflammation; Cellular changes and stimuli; Morphologic patterns of acute inflammation; Chemical mediators and regulators of inflammation</p> <p><b>Seminar:</b> Cell mediators of inflammation;</p> <p><b>Practical work: Histopathology Exercise 5:</b> Inflammation</p> <p><b>Autopsy and autopsy technique</b></p>	<p>4</p> <p>1</p> <p>3</p>
Week 6.	<p><b>Lecture:</b> Chronic inflammation: Cellular and morphologic characteristics; Granulomatous inflammation; Systemic effects of inflammation</p> <p><b>Seminar:</b> Specific inflammation</p> <p><b>Practical work: Histopathology Exercise 6:</b> Oncology (Benign tumors)</p> <p><b>Autopsy and autopsy technique</b></p>	<p>4</p> <p>1</p> <p>2</p> <p>1</p>
Week 7.	<p><b>Lecture:</b> Overview of tissue repair mechanisms and patterns; cell and tissue regeneration; Selected clinical examples of tissue repair mechanisms and fibrosis</p> <p><b>Seminar:</b> Tissue repair mechanisms</p> <p><b>Practical work: Histopathology Exercise 7:</b> Oncology (Benign tumors)</p> <p>Macroscopic diagnostics: case study</p> <p><b>Autopsy and autopsy technique and exam</b></p>	<p>4</p> <p>1</p> <p>2</p> <p>1</p>
Week 8.	<p><b>Lecture:</b> Environmental and nutritional diseases: Fundamental principles; Toxicity of chemical and physical agents; the role of environmental pollution</p> <p><b>Seminar:</b> Tobacco and alcohol effects</p> <p><b>Practical work: Histopathology Exercise 8:</b> Oncology (Benign tumors)</p> <p>Macroscopic diagnostics: case study</p> <p><b>Partial exam 1 (M 1-3)</b></p>	<p>4</p> <p>1</p> <p>3</p>

Week 9.	<p><b>Lecture:</b> Injury by therapeutic drugs and drugs of abuse; adverse drug reactions; injury by nontherapeutic agents; Injury by physical agents; introduction to nutritional diseases and disorders; Malnutrition and vitamin deficiencies; obesity; diet and diseases/cancer</p> <p><b>Seminar:</b> The most common drug reactions; Avitaminoses</p> <p><b>Practical work: Histopathology Exercise 9:</b> Oncology (Malignant tumours) Macroscopic diagnostics: case study</p>	<p>4</p> <p>1</p> <p>3</p>
Week 10.	<p><b>Lecture:</b> Introduction to immune system; immune cells and their roles; normal immune responses;</p> <p><b>Seminar:</b> Hypersensitivity reactions: causes and types</p> <p><b>Practical work:</b> Macroscopic diagnostics: case study Preparing for Microscopic (Histopathology) examination</p>	<p>4</p> <p>1</p> <p>3</p>
Week 11.	<p><b>Lecture:</b> Autoimmune disorders (diseases): key concepts and mechanisms; Rejection of transplants: key concepts of transplantation immunopathology; Immune deficiency disorders: congenital and acquired (AIDS); Amyloidosis</p> <p><b>Seminar:</b> Autoimmune diseases</p> <p><b>Practical work:</b> Pathohistological laboratory: Preparation of tissue for pathohistological procedure Macroscopic diagnostics: case study</p> <p><b>Microscopic Examination (Histopathology)</b></p>	<p>4</p> <p>1</p> <p>3</p>
Week 12.	<p><b>Lecture:</b> Fundamental principles of genetic diseases; mutations (types and implications) Mendelian disorders; concepts and examples of Mendelian inheritance; Complex multigenic disorders; cytogenetic disorders; Congenital anomalies with examples; Developmental disorders; tumour and tumour-like conditions of infancy and childhood;</p> <p><b>Seminar:</b> Autosomal-dominant and recessive disorders: Clinical approach</p> <p><b>Practical work:</b> Pathohistological laboratory: Biospy "ex tempore" Macroscopic diagnostics: case study</p>	<p>4</p> <p>1</p> <p>3</p>

Week 13.	<p><b>Lecture:</b> Molecular diagnosis of Mendelian and complex disorders: key concepts and examples; Neoplasia; tumour nomenclature; epidemiology of cancer; characteristics of benign and malignant tumours; Molecular and cellular basis of cancer (carcinogenesis)</p> <p><b>Seminar:</b> Morphologic characteristics of tumours</p> <p><b>Practical work:</b> Pathohistological laboratory: Staining methods (histochemistry) Macroscopic diagnostics: case study</p>	<p>4</p> <p>1</p> <p>3</p>
Week 14.	<p><b>Lecture:</b> Hallmarks of cancer (Hanahan and Weinberg concept); Etiology of cancer; carcinogenic agents; Tumour immunology;</p> <p><b>Seminar:</b> Local and systemic effects of tumours;</p> <p><b>Practical work:</b> Pathohistological laboratory: Staining methods (immunohistochemistry) Macroscopic diagnostics: case study</p>	<p>4</p> <p>1</p> <p>3</p>
Week 15.	<p><b>Lecture:</b> Clinical aspects of cancer; tumour staging; grading; diagnostics of cancer</p> <p><b>Seminar:</b> Laboratory diagnosis of cancer.</p> <p><b>Practical work:</b> Pathohistological laboratory: Staining methods (immunohistochemistry) Macroscopic diagnostics: case study</p> <p><b>Partial exam 2 (M 4-7)</b></p>	<p>4</p> <p>1</p> <p>3</p>
Weeks 17/18	<b>Final exam (regular term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0502</b>		Course title: <b>PATOPHYSIOLOGY 1</b>	
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS: <b>5</b>
Status: <b>obligatory</b>	Total contact hours: <b>75</b>		
Prerequisites:	<b>According to the Study Regulation</b>		
Lecturers: <b>Assistant Professor Almir Fajkić MD PhD</b>			
1. Overall aim	The aim of the Pathophysiology 1 course is to give students knowledge about the disease, etiology, pathogenesis, local circulatory disorders, fever, disorders of immunity and disorders of metabolic processes.		
2. Course contents	Module 1. Mechanisms of the beginning, development and outcome of the disease. Module 2. The effects of xenobiotics, biological, psychological and etiological factors, the role of heredity in the onset of the disease. Module 3. The effects of thermal environmental factors, the basic pathophysiological mechanisms of electricity and radiation. Module 4. The effects of physical etiological factors, effects of changed atmospheric pressure. Module 5. The pathophysiological mechanisms of immunity, allergies and autoimmune diseases. Module 6. The pathophysiological mechanisms of local blood flow, hypoxia and fever. Module 7. The pathophysiological mechanisms of the energy balance and metabolic disorders.		
3. Learning outcomes (Knowledge, skills and competences)	Students will acquire information and basic knowledge to recognize functional changes between cells, tissues, and organs, and to understand the pathophysiological mechanisms of the disease. After completing the course, the student will learn the basic medical terminology and be able to adequately present the medical facts, understand the etiology and pathogenesis of basic metabolic and functional disorders of organs and organ systems; be able to link the clinical manifestation of the causes and mechanisms of their formation and have a pathophysiological basis for understanding the mechanisms of the disease.  <i>Through the lectures and seminars, the students will acquire the following knowledge and competences:</i>  <div><div>1.</div><div>Learn basic pathophysiological mechanisms of origin, development and outcome of the disease</div></div> <div><div>2.</div><div>Discover basic pathophysiological mechanisms of action of xenobiotics, biological, psycho-social and hereditary etiological factors on the body.</div></div>		

	<ol style="list-style-type: none"> <li>3. Understand basic pathophysiological mechanisms of thermal environmental factors, basic pathophysiological mechanisms of electricity and radiation effects</li> <li>4. Recognize pathophysiological mechanisms of how physical and etiological factors effect the body, and an activity-altered atmospheric pressure</li> <li>5. Analyze basic pathophysiological mechanisms of immunity, allergies, autoimmune diseases.</li> <li>6. Learn pathophysiological mechanisms and local blood flow, hypoxia and fever.</li> <li>7. Be introduced to basic pathophysiological mechanisms of disorders of the energy transport and metabolic disorders.</li> </ol> <p><i>Through the practical laboratory work, the students will acquire the following skills:</i></p> <ul style="list-style-type: none"> <li>- Functional testing of the cardiovascular system - hemodynamics disorders, disorders of blood pressure and pulse <ul style="list-style-type: none"> <li>• Harward – step test</li> <li>• Schellong 1 test</li> <li>• Schellong 2 test</li> <li>• Ruffier test</li> </ul> </li> <li>- Pathophysiology of ischemic pain</li> <li>- Markers of inflammation</li> <li>- Disorders of acid-base status</li> <li>- Electrocardiography <ul style="list-style-type: none"> <li>• Introduction, disorders of the electric axis of the heart</li> <li>• Rhythm disorders</li> <li>• Identification of conduction disorders</li> <li>• Characteristics of hypertrophy</li> <li>• Acute coronary syndromes</li> <li>• Myocardial infarction</li> </ul> </li> <li>- Functional testing of the respiratory system - testing pulmonary ventilation <ul style="list-style-type: none"> <li>• Obstructive ventilatory disorders</li> <li>• Restrictive ventilatory disorders</li> </ul> </li> </ul>
4. Teaching methods	Lectures: 30 hours Seminars: 15 hours Laboratory work: 30 hours
5. Method of knowledge assessment and	Continuous knowledge assessment <b>Seminars</b> During the course duration the students will be tested several times.

examination	<p>The maximum number of points is 5.</p> <p><b>Practical work</b></p> <p>The verification of acquired skills through practical exercises will be carried out continuously through the three colloquia. The maximum number of points is 35:</p> <ul style="list-style-type: none"> <li>• Colloquium 1 - maximum 10 points; passing minimum 5,5 points.</li> <li>• Colloquium 2 - maximum 15 points; passing minimum 8,2 points.</li> <li>• Colloquium 3 - maximum 10 points; passing minimum 5,5 points.</li> </ul> <p><b>The structure of the colloquium:</b></p> <ol style="list-style-type: none"> <li>1. MCQ</li> <li>2. Essays</li> <li>3. Questions with amendments.</li> </ol> <p>Each question is scored +1 or -1 point based on the correct or incorrect answer to the question.</p> <p>The points from the colloquia are added to other points after both partial exams. The colloquia which student failed during the course, can be retaken on the final and the repeated exam.</p> <p><b>Partial exam 1</b></p> <p>The partial exam includes modules 1, 2, 3 and 4, and is structured in two parts: the written and the oral parts. The written part is in the form of an MCQ test with 10 questions. Each question is scored +1 or -1 point based on the correct or incorrect answer to the question. The student can score the maximum of 10 points. A student who acquires 55% on the test takes an oral exam which consists of 3 questions. The maximum number of points on the oral exam is 20. Seminars are part of the test and the oral exam. The maximum number of points on the partial exam 1 is 30 (MCQ test 10 points + the oral exam 20 points).</p> <p><b>Partial exam 2</b></p> <p>The partial exam 2 includes modules 5, 6, and 7. It is structured in two parts: the written and the oral exams. The written part is in the form of an MCQ test with 10 questions. Each question is scored +1 or -1 point based on the correct or incorrect answer to the question. The student can score the maximum of 10 points. A student who acquires 55% on the test takes an oral exam which consists of 3 questions. The maximum number of points on the oral exam is 20. Seminars are part of the test and the oral exam.</p>
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	<p><b>Final exam</b></p> <p>The final exam consists of those parts the student did not pass during the course. The final exam has the same structure as the partial exams.</p> <p>The written test – 20 questions:</p> <p>MCQ test 1 - 10 questions (modules 1, 2, 3, and 4)</p> <p>MCQ test 2 - 10 questions (modules 5, 6, and 7).</p> <p>A student who scores 55% on both tests takes the oral exam with 6 questions from the modules which were parts of the partial exams. The maximum number of points on the final exam is 60.</p> <p>A student who has passed certain parts of the course, on the final exam passes the remaining parts.</p> <p><b>The repeated and correction exams</b></p> <p>The repeated and correction exams are conducted according to the previously defined criteria of the final exam.</p> <p>Final score is obtained on the basis of the sum of points achieved during the course:</p> <ol style="list-style-type: none"> <li>1. Seminars – maximum 5 points.</li> <li>2. Colloquia – maximum 35 points.</li> <li>3. Partial exams – maximum 60 points.</li> </ol>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> <li>– Matko Marušić, Zdenko Kovač, Stjepan Gamulin. Pathophysiology. Zagreb: Medicinska naklada; 2013.</li> <li>– Kubishkin A.V. General and clinical pathophysiology. Vinnytsia: Nova Knyha Publishers 2011.</li> <li>– Gary D. Hammer, Stephen J. McPhee, Pathophysiology of Disease. 7th ed. New York: McGraw-Hill Education; 2014.</li> <li>– Almir Fajkić. A textbook of practical pathophysiology. Sarajevo: Medical faculty University of Sarajevo; 2018.</li> </ul> <p>Additional:</p> <ul style="list-style-type: none"> <li>– McCance LK, Huether ES. Pathophysiology. The Biologic Basis for Disease in Adults and Children, 6th ed. St. Louis: Mosby; 2010.</li> </ul>

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:</p> <p><a href="mailto:patofiziologija@mf.unsa.ba">patofiziologija@mf.unsa.ba</a>; <a href="mailto:almir.fajkic@mf.unsa.ba">almir.fajkic@mf.unsa.ba</a></p>
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## COURSE PLAN: PATHOPHYSIOLOGY 1

Days	Form of Instructions and materials	Number of classes
Day 1.	Lectures: Subject of Pathophysiology. Objectives of Pathophysiology. Purpose of Pathophysiology. Health and disease. Periods of disease (latency, onset of disease, manifestations of disease, outcomes of disease). Etiology. Description of main etiological factors. Pathogenesis. Pathological reactions. Pathological process. Pathological condition.	2
	Laboratory practical work: Functional testing of the cardiovascular system - hemodynamics disorders, disorders of blood pressure and pulse. Harvard Step test Schellong 1 test Schellong 2 test Ruffier test	2
	Seminar: Resuscitation, Sanogenesis	1
Day 2.	Lectures: The role of hereditary factors in the development of the disease: the role of constitution and diathesis. The action of psychosocial etiological factors.	2
	Seminar: Pathophysiology of pain	1
	Laboratory practical work: Pathophysiology of pain Ischemic pain	2
Day 3.	Lectures: The pathophysiological effects of chemical and biological etiological factors.	2
	Seminar: Pathophysiology of inflammation	1
	Laboratory practical work: Markers of inflammation Erythrocyte sedimentation rate (ESR)	2
Day 4.	Lectures: Thermoregulation dysfunction. Hyperthermia. Causes. Disorders in organism in hyperthermia. Hypothermia. Causes. Disorders in organism in hypothermia. Application of hypothermia in medicine.	2
	Seminar: Clinical signs of hypothermia and hyperthermia	1

	Laboratory practical work: Pathophysiology of acid base disorders. Problem: Pathophysiology of acute respiratory alkalosis	2
Day 5.	Lectures: Pathophysiology of radiation exposure. The effects of non-ionizing and ionizing radiation. Acute and chronic radiation sickness. The effect of electricity.  Seminar: Pathophysiology of malignant transformation and growth  Laboratory practical work: Colloquium 1	2  1 2
Day 6.	Lectures: Function of external physical factors: acceleration and kinetosis, vibration, sound and ultrasound. The effect of modified atmospheric pressure.  Seminar: Evaluation and functional aspects of various types of shock  Laboratory practical work: Electrocardiography. Introduction.	2  1 2
Day 7.	Lectures and Seminar - Partial exam 1  Laboratory practical work: Electrocardiographic characteristics of rhythm disorders- nomotopic and heterotopic disorders	2+1  2
Day 8.	Lectures: Typical disorders of the immune system. Immunopathological states: allergy, conditions and diseases of immune autoaggression, immune deficiency states, pathological tolerance. Autoimmunity and autoimmune diseases.  Seminar: Immunodeficiency disorders  Laboratory practical work: Electrocardiographic characteristics of conduction disorders	2  1 2
Day 9.	Lectures: Disorders of microcirculation  Hypoxia  Seminar: Thromboembolism  Laboratory practical work: Electrocardiographic characteristics of hypertrophy	2  1 2

Day 10.	Lectures: Pathophysiology of fever	2
	Pathophysiology of metabolism – starvation	1
	Seminar: Obesity	2
	Laboratory practical work: Electrocardiographic characteristics of acute coronary syndrome	2
Day 11.	Lectures: Pathophysiology of carbohydrate metabolism. Causes and consequences of carbohydrate digestion disorders. Hyperglycemia. Hypoglycemia. Disorders of carbohydrate intermediary metabolism.	2
	Seminar: Diabetes mellitus	1
	Laboratory practical work: Colloquium 2	2
Day 12.	Lectures: Pathophysiology of lipid metabolism. Hyperlipidemia.	2
	Pathophysiology of protein metabolism. Dysproteinemia types and features.	1
	Seminar: Atherosclerosis.	2
	Laboratory practical work: Functional testing of the respiratory system. Spirometry.	2
Day 13.	Lectures: Pathophysiology of water-electrolyte and mineral balance. Negative water-electrolyte balance. Hypo-, iso- and hyperosmolaric types of dehydration. Positive water-electrolyte balance. Types of hyperhydration.	2
	Seminar: Pathogenesis and classification of edema.	1
	Laboratory practical work: Spirometric characteristics of obstructive and restrictive ventilation disorders	2
Day 14.	Lectures: Acid-base disorders. Acidosis and alkalosis.	2
	Pathophysiology of metabolism of vitamins. Deficiency of water-soluble vitamins (B1, B2, B6, B12, C, PP). Deficiency of fat-soluble vitamins (A, D, E, K).	1
	Seminar: Disorders of metabolism of minerals (Na, K, Ca, P) and microelements (F, J, Cu, Se, Mn).	

	Laboratory practical work: Problem: Pathophysiology of bronchial asthma	2
Day 15.	Lecture and Seminar- Partial exam 2	2+1
	Laboratory practical work: Colloquium 3	2
<b>Week 17.-18.</b>	<b>Final exam (regular term)</b>	
<b>Week 19.-20.</b>	<b>Final exam (make-up examination term)</b>	
<b>September</b>	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0503</b>	Course title: <b>PHARMACOLOGY AND TOXICOLOGY I</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS: <b>5</b>
Status: <b>obligatory</b>	Total contact hours: <b>80</b>		
Prerequisites: <b>According to the study regulation</b>			
Lecturers: <b>Full Professor Svjetlana Loga- Zec MD PhD, Associate Professor Jasna Kusturica MD PhD, Associate Professor Maida Rakanović-Todić MD PhD, Assistant Professor Aida Kulo Ćesić, Assistant Professor Lejla Burnazović-Ristić MD PhD, Assistant Sanita Maleškić MD</b>			
1. Overall aim	The overall aim of the Pharmacology and Toxicology I Course is to gain basic knowledge in pharmacology and toxicology including rationale in pharmacological treatment of pain and use of antimicrobial therapy.		
2. Course contents	<p>The following topics will be covered within the Modules:</p> <p>Module 1. General pharmacology, iatrogenic toxicology and drug prescription</p> <p>Module 2. Pharmacology of pain and inflammation</p> <p>Module 3. Chemotherapy of infections and fundamentals of rational pharmacotherapy</p> <p>Module 4. Anesthesia</p> <p>Module 5. Treatment of malignancies</p> <p>Module 6. Blood pharmacology</p>		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge necessary for understanding basic concepts of pharmacodynamics and pharmacokinetics, basic toxicology and adverse events rational prescription of medications in pain, inflammatory and infective diseases. Through practical work students will understand and be able to implement rational prescription of drugs according to the characteristics of individual patient.</p> <p><i>Through the lectures and seminars, the students will gain following knowledge and competences:</i></p> <p>1. Understand the general principles of pharmacology, basics of pharmacodynamics and pharmacokinetics.</p> <p>2. Discover drug development, adverse effects and drug interactions.</p> <p>3. Learn the treatment after poisoning and overdose.</p> <p>4. Discover the fundamentals of pharmaco-economics.</p>		

	<p>5. Understand the pharmacology of pain and inflammation, non-steroid anti-inflammatory drugs (NSAIDs), narcotic analgesics, antihistamines, anti-inflammatory and immunosuppressive drugs.</p> <p>6. Understand pharmacology of infections.</p> <p>7. Learn the therapy of pain and fever.</p> <p>8. Learn the treatment of infectious diseases with antimicrobials.</p> <p>9. Understand anesthesia, anesthetic preparation, local and general anesthetics and drugs that affect the cholinergic system.</p> <p>10. Discover drugs for treatment of malignancies.</p> <p>11. Understand drugs that affect hemostasis, thrombosis, and the hematopoietic system.</p> <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>- Rational prescription of a drug according to the characteristics of an individual patient by applying a pharmacotherapy algorithm</li> <li>- Rational prescription of analgesics/antipyretics</li> <li>- Rational prescription of drugs in the treatment of infectious diseases</li> <li>- Adequate dosing of drugs in order to prevent unsafe and ineffective treatment</li> </ul>
4. Teaching methods	<ul style="list-style-type: none"> <li>- Lectures: 32 hours</li> <li>- Seminars: 22</li> <li>- Laboratory practical work: 26 hours</li> </ul>
5. Method of knowledge assessment and examination	<p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical Laboratory Colloquium.</p> <p>Continuous assessment of knowledge consists of:</p> <ul style="list-style-type: none"> <li>- Colloquium 1 and 2</li> <li>- Partial Exam 1 and 2</li> </ul> <p>The mandatory requirement for a partial examination is a colloquy.</p> <p><b>Partial exams:</b></p> <p>Partial exam 1 includes topics covered in Module 1 and 2.</p> <p>Partial exam 2 includes topics covered in Modules 3-6.</p> <p>Partial exam will be in the form of written test with 15 Multiple choice questions (MCQ) and 5 Extended response questions (ERQ).</p> <p>Each correct answer to the MCQ question score 1 point, and the correct and complete answer to the ERQ score 3 points. The minimum of acquired points is 16 points (55%, rating 6) and maximum is 30 points.</p> <p><b>Colloquium 1 and 2:</b></p> <p>Within the Colloquium 1, the student can acquire a minimum of 11 and a maximum of 20 points.</p>

	<p>Within the Colloquium 2, the student can acquire a minimum of 11 and a maximum of 20 points.</p> <p><b>Final exam:</b> For students who did not pass any of the parts of a continuous knowledge and skills assessment.</p> <p>The final grade is formed by summing up all the points earned for each form of knowledge checking (minimum 55, maximum 100 points), with respect to the following rules and regulations:</p> <ul style="list-style-type: none"> <li>○ 95-100% correct answers - grade 10</li> <li>○ 85-94% correct answers - grade 9</li> <li>○ 75-84% correct answers - grade 8</li> <li>○ 65-74% correct answers - grade 7</li> <li>○ 55-64% correct answers - grade 6</li> <li>○ rest of the students – failing grade - grade 5</li> </ul>
6. Literature	<p>Recommended</p> <ul style="list-style-type: none"> <li>– Rang HP, Dale MM, Ritter JM, Flower JR, Henderson G. Pharmacology. USA.7th edition. Elsevier Inc; 2012.</li> <li>– Katzung's - Basic and Clinical Pharmacology. 12th edition. USA. The McGraw Hill Companies Inc; 2012.</li> <li>– Brunton L, Chabner B, Knollman B. Goodman &amp; Gilman's the pharmacological basis of therapeutics. USA 12th edition.The McGraw Hill Companies Inc; 2011.</li> </ul>
7. Remarks	<p>Consultations will be possible every day from 12 to 13 h., with advance notice to the secretary of the Department or by e-mail: <a href="mailto:farmakologija@mf.unsa.ba">farmakologija@mf.unsa.ba</a></p> <p>In case of absences from teaching, the procedure defined by actual legal regulations will be followed.</p>

## COURSE PLAN: PHARMACOLOGY AND TOXICOLOGY 1

Week	Form of teaching	Number of hours
Week 1.	<p><b>Lecture:</b> Introduction to pharmacology. Concept of drug/medicine, biological variability, biological experiments, International unit. Basics of toxicology and safety (therapeutic width and therapeutic index). Basics of pharmacoeconomics</p> <p><b>Seminar:</b> Drug development. Types of doses and basics of drug dosing in practice and experimental pharmacology</p> <p><b>Practical work:</b> Sources of drug information (classical, electronic). Legislations in prescribing medicines, poisons, narcotic drugs</p>	<p>2</p> <p>2</p> <p>2</p>
Week 2.	<p><b>Lecture:</b> Basics of pharmacodynamics, quantification of drug effect (dose and effect ratio), agonist, antagonist, selectivity, specificity</p> <p><b>Seminar:</b> The concentration-effect curve. Preparation for the next seminar</p> <p><b>Practical work:</b> The basics of drug prescription</p>	<p>2</p> <p>2</p> <p>2</p>
Week 3.	<p><b>Lecture:</b> Molecular mechanism of drug action</p> <p><b>Seminar:</b> Debates on drug policy (pros and cons): Essential drug list, financing models, generics, registration of medicines, fake medicines. Preparation for the next seminar</p> <p><b>Practical work:</b> Prescription of solid pharmaceutical formulations for oral use and liquid formulations for anal use</p>	<p>2</p> <p>2</p> <p>2</p>
Week 4.	<p><b>Lecture:</b> Basics of pharmacokinetics</p> <p><b>Seminar:</b> Application of drugs in special population of patients. Factors affecting drug effects. Interactions and unwanted effects</p> <p><b>Practical work:</b> Prescribing liquid formulations for parenteral administration, inhalation</p>	<p>2</p> <p>2</p> <p>2</p>
Week 5.	<p><b>Lecture:</b> Acute and chronic toxicity of drugs. Therapies of drug intoxication</p> <p><b>Seminar:</b> Overdose therapy, case studies (aspirin, paracetamol, opioid drugs, psychostimulants)</p> <p><b>Practical work:</b> Prescription of liquid and solid forms of medicines for application on the skin and mucous membranes</p>	<p>2</p> <p>2</p> <p>2</p>
Week 6.	<p><b>Lecture:</b> Pharmacology of pain and inflammation. NSAIDs and</p>	<p>2</p>



	<p>opioid analgesics, antihistamines</p> <p><b>Seminar:</b> Gout therapy, case study (treatment of an acute attack, effects, undesirable effects and interactions). Preparation of P-drugs registry for glucocorticoids, antihistamines</p> <p><b>Practical work:</b> Prescription of liquid forms of drugs for oral use. Prescription of other medicinal products</p>	<p>2</p> <p>2</p>
Week 7.	<p><b>Lecture:</b> Drugs in treatment of infectious diseases, beta-lactam antibiotics</p> <p><b>Seminar:</b> Rheumatoid arthritis therapy, case study (treatment groups, first line therapy, immunosuppressive drugs - efficacy and safety)</p> <p><b>Practical work: Colloquium 1</b></p>	<p>2</p> <p>2</p> <p>2</p>
Week 8.	<p><b>Lecture:</b> Protein synthesis inhibitors and other antibacterial drugs. Drugs against mycobacteria.</p> <p><b>Seminar:</b> Preparation of P-drugs registry form for macrolides, sulfonamides, beta-lactams</p> <p><b>Practical work:</b> The basics of rational pharmacotherapy, a rational treatment process. Choice of P-drugs for febrile episodes and pain. Preparation of P-drugs registry form for NSAIDs and other analgesics. Exercises with simulated patients.</p>	<p>2</p> <p>1</p> <p>2</p>
Week 9.	<b>PARTIAL EXAM 1</b>	3
Week 10.	<p><b>Lecture:</b> Antiviral drugs, antiprotozoal drugs, antifungal drugs, anthelmintics</p> <p><b>Seminar:</b> Preparation of P-drugs registry form for tetracyclines, aminoglycosides, fluorohinolones</p> <p><b>Practical work:</b> Choosing P-drugs in the treatment of infectious diseases</p>	<p>2</p> <p>2</p> <p>2</p>
Week 11.	<p><b>Lecture:</b> Pharmacology of blood diseases</p> <p><b>Seminar:</b> Preparation of P-drugs registry form for iron preparations, folic acid</p> <p><b>Practical work:</b> Exercises with simulated patients, infectious diseases</p>	<p>2</p> <p>2</p> <p>2</p>
Week 12.	<p><b>Lecture:</b> General anesthetics, local anesthetics</p> <p><b>Seminar:</b> Treatment of infections caused by herpes viruses. Preparation of P-drugs registry form for antiviral drugs,</p>	<p>2</p> <p>1</p> <p>2</p>

	antimicrobials and antihelmintics <b>Practical work:</b> Anaphylactic shock and anti-shock therapy. Exercises with simulated patients	
Week 13.	<b>Lecture:</b> Pharmacology of vegetative nervous system <b>Seminar:</b> Holinergic transmission, muscle relaxants <b>Practical work:</b> Holinergics, antiholinergics, adrenergic drugs, adrenergic blockers, histamine and antihistamines, serotonin (agonists and antagonists)	2 2 2
Week 14.	<b>Lecture:</b> Chemotherapy of malignant diseases <b>Practical work: Colloquium 2</b>	2 2
Week 15.	<b>PARTIAL EXAM 2</b>	3
Week 17./18.	<b>Final exam (regular examination term)</b>	
Week 19./20.	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0504</b>	Course title: <b>Medical Microbiology 1</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ETCS: <b>4</b>
Status: <b>obligatory</b>	Total contact hours: <b>60</b>		
Prerequisites :	<b>According to the study regulation</b>		
Lecturers: Associate Professor Sabina Mahmutović Vranić MD PhD, Associate Professor Mufida Aljičević MD PhD, Assistant Professor Velma Rebić MD PhD, Assistant Amila Abduzaimović MD			
1. Overall aim	The overall aim of the Medical Microbiology 1 Course is to increase the students' understanding of etiological factors of infectious diseases caused by bacteria, viruses, fungi and parasites as well as their morphology, identification, pathogenesis, basic clinical features, biological samples, therapy basics.		
2. Course contents	<p>The following topics will be covered within the Modules:</p> <p>Module 1: General bacteriology</p> <p>Module 2: Infection and contagious disease</p> <p>Module 3: Etiological factors of bacterial respiratory infections</p> <p>Module 4: Etiological factors of bacterial digestive and urinary infections</p> <p>Module 5: Tuberculosis</p> <p>Module 6: Sporogenous bacteria</p> <p>Module 7: Current issues related to sexually transmitted diseases and zoonoses</p>		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will gain the knowledge about determining the morphology, structure and role of various microorganisms causing infectious diseases; and will be able to understand importance of applying adequate antiinfective therapy in a timely manner. Through practical work students will gain knowledge to prepare, visualize and analyze different species of microorganisms by using several methods of laboratory work.</p> <p><i>Through the lectures students will gain following knowledge and competences:</i></p> <p>1. Adequate evaluation of the importance and role of knowledge acquired during the Medical Microbiology 1 course in terms of determining the role of microorganism causing infectious diseases</p> <p>2. Types, value and quality of certain biological samples collected in order to isolate and identify the causes of infectious diseases, types of the applied microbiological analyses, further analyses necessary in order to detect causal agents of disease, as well as decision on the choice of antimicrobial therapy</p>		

	<p>3. Types, forms and isolates of bacterial respiratory infections</p> <p>4. Types, forms and isolates of bacterial digestive and urinary infections</p> <p>5. Mycobacterium Tuberculosis with its specificities</p> <p>6. Specificities of sporogenous bacterias</p> <p>7. Types, forms and isolates of sexually transmitted diseases including zoonoses.</p> <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>• Preparation of stained microscope specimen for microscopic detection</li> <li>• Analysis of certain macro-morphological features of adult bacterial colonies and make decisions on further steps in the process of isolation and identification of bacterial species</li> <li>• Recognition of the enzyme activity of certain bacterial genera and species by testing their biochemical features on adequate solid and liquid nutrient media</li> <li>• Recognition of the possibilities of serological typing of certain bacterial species</li> <li>• Choose the methods of testing the antimicrobial susceptibility and resistance to certain antimicrobials (dilution, diffusion method and E-test, interpretation of obtained test results)</li> <li>• Interpretation of microbiological findings in comparison with clinical status of a patient.</li> </ul>
4. Teaching methods	<ul style="list-style-type: none"> <li>• Lectures: 30 hours</li> <li>• Laboratory practical work: 30 hours</li> </ul>
5. Method of knowledge assessment and examination	<p>Written test in the form of – Multiple Choice Questions (MCQ) test.</p> <p>Continuous knowledge and skills assessment will be carried out through partial exam, written essay and practical laboratory colloquium.</p>
6. Literature	<p>Obligatory:</p> <p>Carroll, K. (2016). <i>Jawetz, Melnick &amp; Adelberg's medical microbiology</i>. 1st ed. New York: McGraw-Hill Education.</p>
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: mikrobiologija@mf.unsa.ba</p>

### COURSE PLAN: MEDICAL MICROBIOLOGY 1

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<b>Lecture:</b> Cell Structure of Bacteria.	2
	<b>Practice:</b> General principles of work in the microbiological laboratory. Sterilization and disinfection.	2
Week 2.	<b>Lecture:</b> Microbial Metabolism. Microbial Genetics.	2
	<b>Practice:</b> Staining of bacteria and microscopy.	2
Week 3.	<b>Lecture:</b> Pathogenesis of Bacterial Infection.	2
	<b>Practice:</b> Cultivation of Microorganisms.	2
Week 4.	<b>Lecture:</b> Mechanisms of Action of Antimicrobial Drugs. Resistance of Antimicrobial Drugs.	2
	<b>Practice:</b> Antimicrobial Activity In Vitro.	2
Week 5.	<b>Lecture:</b> Vaccines, immunotherapy and immunoprophylaxis.	2
	<b>Practice:</b> Serological Reactions.	2
Week 6.	<b>Lecture:</b> The Staphylococci. The Streptococci, Enterococci and Related Genera.	2
	<b>Practice:</b> Microscope Slides. Optochin Test. Bacitracin Test.	2
Week 7.	<b>Lecture:</b> Genera: Haemophilus, Neisseria, Bordatella, Corynebacterium.	2
	<b>Practice:</b> Microscope Slides.	2

Week 8.	<b>Lecture:</b> Enteritic Gram-Negative Rods.	1
	<b>Partial exam 1</b>	1
	<b>Practice:</b> Laboratory diagnostics of urinary tract infections.	1
	<b>Colloquium 1</b>	1
Week 9.	<b>Lecture:</b> Enteritic Gram-Negative Rods. Genera: Pseudomonas, Acinetobacter, Legionella.	2
	<b>Practice:</b> Coproculture. Blood Culture. Liquor Examination.	2
Week 10.	<b>Lecture:</b> Genera: Vibrio, Campylobacter, Helicobacter, Francisella, Erysipelothrix, Pasteurella.	2
	<b>Practice:</b> Laboratory diagnostics of brucellosis.	2
Week 11.	<b>Lecture:</b> Genera: Mycobacterium.	2
	<b>Practice:</b> Microbiological diagnostics of tuberculosis.	2
Week 12.	<b>Lecture:</b> Spore-Forming Gram-Positive Bacilli: <i>Bacillus</i> and <i>Clostridium</i> Species. Anaerobic Non Spore-Forming Bacteria. Genera: Bacteroides, Fusobacterium and Lactrobacillus.	2
	<b>Practice:</b> Anaerobic cultivation.	2
Week 13.	<b>Lecture:</b> Sprichotes and Other Spiral Microorganisms: Treponema, Leptospira, Borrelia.	2
	<b>Practice:</b> Microscope Slides	2
Week 14.	<b>Lecture:</b> Genera: Mycoplasma, Chlamydia, Gardnerella, L-form bacteria.	2
	<b>Practice:</b> Laboratory diagnostics of sexually transmitted infections.	2
Week 15.	<b>Lecture:</b> Genera: Rickettsia. Ehrlichia. Zoonosis: <i>Coxiella spp.</i> , <i>Brucella spp.</i> and <i>Listeria spp.</i>	1

	<b>Partial exam 2</b>	1
	<b>Practice:</b> Laboratory diagnostics of Q-fever	1
	<b>Colloquium 2</b>	1
Weeks. 17/18	<b>Final exam (regular term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination exam)</b>	

Code:MFSE 0505	Course title: EPIDEMIOLOGY		
Level: preclinical	Study year: III	Semester: V	ECTS: 4
Status: obligatory	Total contact hours: 60		
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 principles and methods used in epidemiology and epidemiological research. They are introduced to basic elements in research, and epidemiological methods which makes it possible to understand etiology factors, modes of transmission and pathogenesis, through studying distribution and disease dynamics in a population. Students should master infectious and chronic diseases prevention and control, as well as basic principles in disaster epidemiology.		
2. Course objectives	The objective of the module is for students to master the basic elements and application of epidemiological principles and methods needed in everyday medical practice as well as in research, causality concepts, and prevention and control of mass communicable / infectious and chronic diseases.		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students should master the following knowledge:</p> <p><b>Module 1. Theory of modern epidemiology</b></p> <p>Students should master the aims and objectives of epidemiology, its history, basic epidemiological theories and their application in modern biomedical science, as well as epidemiological approach to a disease and basics in infectious and chronic diseases epidemiology.</p> <p><b>Module 2. Measures of disease occurrence and measures of association; bias and confounding</b></p> <p>Students are introduced to measures of disease frequency (incidence and prevalence), as well as bias and confounding, should learn how to calculate and use them.</p> <p><b>Module 3. Epidemiological methods</b></p> <p>Students should familiarize themselves and master basics in observational and experimental methods, design of descriptive studies (case report, case series, cross-sectional studies, ecologic – correlation studies), and basic principles of analytic epi methods: case control and cohort studies, as well as screening.</p> <p><b>Module 4. Measures of association and bias; Causality. Epidemiological hypotheses.</b></p> <p>Students should familiarize themselves with hypotheses in epidemiological research, application of measures of association and bias within analytical epidemiological studies, principles of causality and effect modification, as well as the relation between stating and testing statistical and epidemiological hypotheses and confidence interval choice and application of appropriate measure of association and statistical test to test association hypotheses. Students will be introduced to appropriate computer software application in these processes.</p> <p><b>Module 5. Factors influencing epidemics evolution, spread and</b></p>		



**self-regulation. Investigating epidemics. Surveillance in public health**

Students should master factors influencing epidemic evolution, basic principles in epidemic investigation using descriptive methods, as well as basics surveillance elements in public health and infectious diseases, and legislation of registering of infectious diseases in Bosnia and Herzegovina.

**Module 6. Epidemiology of infectious diseases**

Students should master basics in characteristics and spread of infectious diseases, characteristics of food-borne diseases (alimentary spread); air-borne (respiratory); contact (direct and indirect – sexually and blood-borne diseases); zoonosis; hospital infections, as well as specific modes of transmission prevention methods. They will be specifically introduced to intrahospital infections, i.e. infections in health care facilities and prevention methods.

**Module 7. Epidemiology of (mass) chronic diseases**

Students should master models of evolution and risk factors of (mass) chronic diseases, i.e. cancer epidemiology, cardiovascular, diabetes mellitus, genetic epidemiology, disaster epidemiology, and existence and making of (mass) chronic diseases registries.

**Module 8. Basics in infectious/communicable and chronic diseases prevention**

Students should master general (isolation, quarantine) and specific measures (immunization, disinfection, disinsection and deratization) of infectious disease prevention.

**Module 9. Global burden of disease. Vital statistics – mortality standardization**

Students should master basics in mortality standardization and are introduced to calculations in global burden of disease concepts.

Students should master the following skills and competencies:

- Planning, implementing, analyzing and results distribution in epidemiological research.
- Design, implementation, analysis and interpretation of epidemiological research.
- Contribution of epidemiology to all biomedical research.
- Understanding the epidemic process and elements in transmission chains, thinking of their prevention and control.
- Process results of epidemiological research in available computer software.

Every student should know how to:

- Design, implement and analyze small epidemiological studies.
- Critically analyze epidemiological studies, syntheses and reports.
- Apply basic techniques of clinical-epidemiological research, calculate the measures of disease frequency, measures of association, differ between a screening and diagnostic test.
- Communicate the scientific results, formulate objectives in a

	<p>research and test them.</p> <ul style="list-style-type: none"> <li>- Formulate and test research and epidemiological hypotheses using methods of bivariate analysis.</li> <li>- Basic steps in investigating an epidemic and disease surveillance (infectious and chronic, and injuries).</li> <li>- Basics of immuno- and sero-prophylaxis of populations of different age groups.</li> <li>- Basic measures of prevention and control of infectious and chronic diseases, on individual and population level and in health care institutions.</li> <li>- Current epidemiologic situation in a country and evaluation of potential emergence of new epidemics.</li> <li>- Present results of own research on a high quality level and argument the difference between good and bad data and results presentation.</li> </ul> <p>Attitudes a student should master after the completion of this course:</p> <ul style="list-style-type: none"> <li>- Knowing basic methods and principles in epidemiology helps understand results of novel research, as well as everyday medical theory and practice.</li> <li>- Epidemiology investigates not only infectious diseases but all mass phenomena and diseases.</li> <li>- Contemporary research in disease causality is alleviated when knowing methods of sample quantification, potential bias and confounding factors analysis.</li> <li>- Application of epidemiological principles and methods made a substantial contribution to human life expectancy extension.</li> <li>- Most infectious and chronic diseases can be prevented both on individual and population level.</li> <li>- It is proved through history that today's population does not get diseases preventable by an effective vaccine.</li> <li>- In case of epidemic emergency, don't panic!</li> </ul>
4. Teaching methods	<p>In semester, there will be total of:</p> <ul style="list-style-type: none"> <li>– 29 hours of lectures;</li> <li>– 29hours of lab sessions / contact with TAs</li> <li>– 2 hours of seminar classes</li> </ul> <p>Every lecture lasts 2 hours (90 minutes). 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 epidemiological and public health practice are given.</p> <p>If possible, depending on time frame and number of students, most of lectures will be organized as <i>seminar classes</i>, i.e. lecturer working with small groups of students, in order to better understand the lectures (e.g. modules 4, 6, 10).</p> <p>Every lab session lasts 2 hours (90 minutes). They are all designed as interactive, problem oriented and with examples from real life practice. Thus, students will work in small groups of 7 students max,</p>

	<p>interactively, with 20 students max per a large group(in one class). Seminar work will be a terrain work and writing of an individual and group seminar papers (2 papers per student max), as a report of a terrain work.</p> <p>One of the papers, in consultation with a lecturer and a TA, is based on project methodology and will be publicly presented.</p>
5. Methods of knowledge assessment and examination	<p>Knowledge assessment will be performed through:</p> <ul style="list-style-type: none"> <li>– short tests / quizzes – total of 5 per semester (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 for 3 or more correctly answered questions. If a student fails a quiz, when taking a final exam he/she will be given an opportunity to take that quiz again, if one wants.)</li> <li>– 1. partial examon general epidemiology. Will have 30 questions max with 1/4 of the questions in the essay form, 1/4 of MCQ calculation questions with 5 given answers (one correct answer), and 1/2 of the MC questions with 4-5 given answers.</li> <li>– 2. partial exam – after the course completion with 30 questions max based on MCQ methodology with 2/3 of MC questions and 1/3 of essay questions</li> <li>– individual work on seminar paper on a given topic in consultation with a lecturer and TAs – total of 2</li> <li>– oral final exam will be organized for students wanting a higher grade (students whose pondered arithmetic mean is up to 0.1 smaller than a possible upper/lower grade) or students showing exceptional results during continuous work during a semester (arithmetic mean of a grade of 9 or higher).</li> </ul> <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> <ul style="list-style-type: none"> <li>– short tests / quizzes 10% of the final grade</li> <li>– 1. partial exam 30% of the final grade</li> <li>– 2. partial exam 40% of the final grade</li> <li>– seminar paper and presentation 20% of the final grade</li> </ul> <p>In case a student fails partial exam/s, he/she will be given that test material on a final exam.</p> <p>Final grade will be calculated as a pondered arithmetic mean (i.e. joint</p>

	<p>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><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>&lt; 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, except short tests / quizzes.</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																				
5 (F, FX)	< 55	Fails to meet minimal criteria																				
6. Literature	<p>Required:</p> <ul style="list-style-type: none"><li>– Course hand-outs</li><li>– CDC. Principles of Epidemiology in Public Health Practice (third edition). US Department of Health and Human Services. Atlanta, 2012.</li><li>– R. Beaglehole, R. Bonita, T. Kjellstrom: Basic Epidemiology. World Health Organisation Geneva, 1993.</li><li>– L. Gordis: Epidemiology. (3rd edition) Elsevier Saunders. 2004.</li><li>– D. Essex-Sorlie: Medical Biostatistics and Epidemiology. Appleton &amp; Lange 1995.</li><li>– S. Čavaljuga. Managerial Epidemiology and Zoonosis Application of Managerial Epidemiology in Control Zoonotic Disease in Bosnia and Herzegovina. Zoonosis. Dr. Jacob Lorenzo Morales (Ed.). In Tech. 2012.</li></ul> <p>Additional:</p> <p><i>(This literature might be helpful to students who have Bosnian language skills)</i></p> <ul style="list-style-type: none"><li>– S. Čavaljuga: Osnovi moderne epidemiologije: nadzor i istraživanje epidemija – in preparation</li><li>– S. Čavaljuga, M. Čavaljuga. Biostatistika: Osnovni principi i metode Medicinski fakultet Univerziteta u Sarajevu, 2009</li><li>– Čustović, S. Čavaljuga. Epidemiološki nadzor zdravstvenih</li></ul>																					

	<p>ustanova, Medicinski fakultet Univerziteta u Tuzli, 2014.</p> <ul style="list-style-type: none"> <li>– S. Čavaljuga i saradnici: Praktikum iz epidemiologije – in preparation</li> <li>– Zakon o zaštiti stanovništva od zaraznih bolesti u FBiH, 2005., Official Gazette 18/05 FBiH, i.e. existing laws and regulations</li> <li>– Z. Radovanović (editor): Epidemiologija. Prosveta Niš. 2005.</li> <li>– V. Babuš i suradnici: Epidemiologija. Medicinska naklada Zagreb. 1997.</li> <li>– V. Babuš: Epidemiološke metode. Medicinska naklada Zagreb, 2000.</li> <li>– H. Vlajinac, M. Jarebinski (urednici): Epidemiologija. Medicinski fakultet Univerziteta u Beogradu, Beograd, 2006.</li> </ul>
7. RemarkS	<p><b>It is forbidden to bring unauthorized copies of literature to classes!</b></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.</p> <p>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 to the Department's Secretary or by email: <a href="mailto:epidemiologija@mf.unsa.ba">epidemiologija@mf.unsa.ba</a></p>

## COURSE PLAN: EPIDEMIOLOGY

Week	Form of Instructions and materials	Number of classes
Week 1.	<b>Lecture:</b> Introduction to modern epidemiology (history of epidemiology; fundamental epidemiological theories; aims and applications of epidemiology; basics of communicable disease epidemiology; epidemiological approach to the disease concept)	2
	<b>Practicals:</b> Epidemiological research design - questionnaire, sampling. Basic statistical methods of data analysis in epidemiological research.	2
Week 2.	<b>Lecture:</b> Measures of disease occurrence, measures of association (rate, proportion, percentage; cumulative incidence, incidence rate; prevalence; measures of association – cross-product ratio (odds ratio), relative risk, attributable risk, population attributable risk (PAR), attributable fraction (AR%), population attributable fraction (PAR%), preventable fraction)	2
	<b>Practicals:</b> Practical examples of measures of disease occurrence calculation and interpretation	2
Week 3.	<b>Lecture:</b> Epidemiological methods: Descriptive epidemiological methods (descriptive epidemiology). Odds and probability in analysis of relationship between exposure and outcome in epidemiological studies.	2
	<b>Quiz No. 1</b> <b>Practicals:</b> Examples of descriptive epidemiological studies. 2x2 table and its application in analysis of association of exposure and outcome in epidemiological studies.	2
Week 4.	<b>Lecture:</b> Screening. Errors in sampling and epidemiological study design (bias, confounding) - part I	2
	<b>Practicals:</b> Practical examples of screening - calculating and interpreting intrinsic and population parameters of screening tests; impact of prevalence change on these parameters. Practical examples of bias in descriptive epidemiological studies.	2
Week 5.	<b>Lecture:</b> Analytical epidemiological methods (analytical epidemiology). Hypotheses in epidemiological research. <b>Quiz No. 2</b>	2

	<b>Practicals:</b> Examples of analytical epidemiological studies with calculating and interpreting measures of associations and measures of impact. Research and statistical hypotheses in analytical epidemiological studies.	2
Week 6.	<b>Lecture:</b> Bias in analytic epidemiology; effect modification. Causality. <b>Practicals:</b> Practical examples on measures of association and bias in analytical epidemiological studies; applying univariate logistic regression in case-control studies and calculating appropriate measures using statistical software package.	2 2
Week 7.	<b>Lecture:</b> Public health surveillance, communicable diseases surveillance. Outbreak investigation. <b>Quiz No. 3</b> <b>Seminar 1:</b> Forming work groups and assigning topics for seminar papers <b>Practicals:</b> Case study: Investigation of an outbreak of food poisoning - Part I	1 1 2
Week 8.	<b>1st Partial Exam</b> <b>Lecture:</b> Special epidemiology of communicable diseases; chain of infection (Vogralik chain); source of infection; modes of transmission of infectious diseases. <b>Practicals:</b> Case study: Investigation of an outbreak of food poisoning - Part II	1 1 2
Week 9.	<b>Lecture:</b> Infectious disease epidemiology (transmitted by: contact, food, water, air; zoonoses, transmissible diseases) <b>Practicals:</b> Outbreak investigation of zoonotic disease	2 2
Week 10.	<b>Lecture:</b> Communicable diseases prevention - general measures, environmental measures, immunization. <b>Quiz No. 4</b> <b>Practicals:</b> Measures of communicable diseases prevention in the environment - methods of disinfection, disinsection and deratization - DDD	2 2
Week 11.	<b>Lecture:</b> Epidemiological surveillance in health-care settings. Basic measures of communicable diseases prevention and control in health-care settings. <b>Practicals:</b> Practical aspects of surveillance in health-care settings.	2 2
Week 12.	<b>Lecture:</b> Epidemiology of chronic diseases, measures of chronic diseases prevention <b>Practicals:</b> Case study: Investigation of an outbreak of a chronic disease - Part I	2 2
Week 13.	<b>Lecture:</b> Causality in chronic diseases epidemiology. Key concepts of epidemiological studies on chronic diseases and risk factors.	1

	<b>Seminar 2:</b> Seminar papers - discussion and elaboration	1
	<b>Practicals:</b> Case study: Investigation of an outbreak of a chronic disease - Part II	2
Week 14.	<b>Lecture:</b> Global burden of disease: mortality rates standardization. <b>Quiz No. 5</b> <b>Practicals:</b> Practical examples on calculating standardized mortality rates.	2  2
Week 15.	<b>2nd Partial Exam</b>  <b>Lecture:</b> Evaluating seminar papers <b>Students' presentations of the best seminar papers</b> <b>Practicals:</b> Clinical epidemiology / Evidence based medicine (EBM) - practical application	1  1  2
Weeks. 17/18	<b>Final exam (regular term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination exam)</b>	



Code: <b>MFSE 0506</b>	Course title: <b>MOLECULAR MEDICINE</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS: <b>2</b>
Status: <b>obligatory</b>	Total contact hours: <b>30</b>		
Prerequisites:	<b>According to the Study regulation</b>		
<b>Lecturers:</b> Associate Professor Emina Kiseljaković MD PhD, Assistant Professor Mirela Mačkić-Đurović PhD, Associate Professor Sabaheta Hasić MD PhD, Associate Professor Radivoj Jadrić MD PhD, Assistant Professor Amina Valjevac MD PhD, Assistant Lejla Alić MD, Assistant Amila Kulo MD			
1. Overall aims	The aims of the Molecular Medicine course are: -To provide insight into a molecular basis and mechanism of the diseases development in individuals with risks for certain diseases; - To introduce the students with basic and modern molecular techniques used in molecular laboratories for diagnostic and screening of diseases;		
2. Course contents	The following topics will be covered in the Modules: Module 1. <b>Principles of the Medical Genetics</b> Aim of module is to expand knowledge about nucleic acid structure, gene expression, mechanism of inheritance, and types of genetic changes Module 2. <b>Single-gene disorders</b> Aim of module is to acquire knowledge about monogenic disorder characteristics and identification of responsible gene for diseases. Characteristics and detection of mitochondrial multisystemic disorders will be introduced to students. Module 3. <b>Complex diseases</b> Aim of module is to acquire knowledge about polygenic disorder characteristics and influence of environment and gene interaction on diseases (diabetes mellitus, arterial hypertension, schizophrenia) Module 4. <b>Modern trends in the field of Molecular Medicine</b> Aim of module is to acquire knowledge about screening for genetic disorders - prenatal, newborn testing, carrier and presymptomatic detection; regenerative medicine and application of stem cell in therapy. Principle and basic molecular techniques used in molecular medicine laboratory will be introduced to student.		
3. Learning outcomes (Knowledge, skills and competences)	On successful completion of this course students will be able to: Recognize molecular mechanism necessary to understand occurrence, development, and possible prevention and treatment of certain human diseases Apply acquired knowledge of molecular laboratory techniques and skills necessary in clinical diagnostic testing.  <i>Through the lectures the students will gain following knowledge and competences:</i>  1. Expand knowledge of the nucleic acids structure and gene expression; process of translating information from gene to protein, the mechanism of inheritance and types of change of genetic material 2. Ability to identify gene responsible for the disease, through expression of specific monogenic inherited disorders.		

	<ol style="list-style-type: none"> <li>3. Identification of characteristic and detection of mitochondrial multisystem diseases.</li> <li>4. Identification of genetics of frequent diseases (diabetes mellitus, hypertension, coronary disease, schizophrenia) and impact of gene- environment interaction on disease development.</li> <li>5. Understand importance of screening for genetic disorders: identification of autosomal recessive disease carriers, presymptomatic testing in individuals at risk for dominant autosomal diseases. Knowledge of basic principles and possibilities of the techniques in molecular laboratory</li> </ol> <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>-isolation, quantifying and analysis of the deoxyribonucleic acid (DNA)</li> <li>-preparing and conducting following techniques for identification of disease associated polymorphisms: <ul style="list-style-type: none"> <li>- Polymerase Chain Reaction (PCR)</li> <li>-restriction fragment length polymorphism-PCR (RFLP-PCR)</li> <li>-analysis of PCR products - gel electrophoresis</li> </ul> </li> <li>-recognize the usage of different PCR methods for mutation and polymorphism detection, and gene-expression level</li> <li>-determination of gene expression products - proteins using: <ul style="list-style-type: none"> <li>- Western blot</li> <li>- ELISA (enzyme-linked immunosorbent <i>assay</i>)</li> </ul> </li> </ul>
4. Teaching methods	<p>Lectures: 12 hours</p> <p>Laboratory practical work: 18 hours</p>
5. Method of knowledge assessment and examination	<p>Continuous assessment of the knowledge and skills (Midterm examination) will be carried out through Partial exam and Practical exams (colloquiums)</p> <p><b>Practical exam (colloquium)</b></p> <p>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 four colloquiums in the form of Multiple choice questions (MCQ). Minimum score needed to pass each colloquium is 7 points (55%) and maximum score is 12,5 points.</p> <p><b>Partial exam</b></p> <p>Knowledge acquired in all four modules will be evaluated using written test in the form of MCQ containing 25 questions (maximum 50 points); the minimum score required to pass the test is 27 points (55%).</p> <p>Students who have successfully accomplished all of their obligations during the semester (attendance is within the legal limits) and who have passed partial exam and four colloquiums are not required to take Regular exam. Their final grade is reported according to points attained during Continuous knowledge assessment.</p>

	Total score attained during continuous assessment		
		min	max
	Colloquiums	28	50
	Partial exam	27	50
	Total	55	100
	<b>Regular examination term</b>		
	Student is obliged to take regular exam if minimum points are not attained during continuous assessment 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 during continuous assessment. Previously defined criteria for Continuous knowledge assessment apply to Regular examination term.		
	Practical exam will be taken before theoretical examination as an obligatory condition for theoretical examination.		
	<b>Re-sit examination term /September examination term</b>		
	Previously defined criteria will also be applied in Re-sit and September examination terms.		
	<b>Grading system and grading points</b>		
	Final grade is reported according to points attained during both forms of the knowledge assessment (practical and theoretical exams).		
	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"> <li>– Peter Turnpenny, Sian Ellard. Emery's ELEMENTS of MEDICAL GENETICS, Elsevier, 15th ed. 2017</li> <li>– Molecular Medicine-Handbook written by Medical Biochemistry Department personnel</li> </ul> <p>Recommended:</p> <ul style="list-style-type: none"> <li>– Lela Buckingham, Maribeth L. Flaws. Molecular Diagnostics: Fundamentals, Methods and Clinical Applications. F.A. Davis Company. 2008</li> </ul>		

	<p>– John M Walker, Ralph Rapley. Molecular Biomethods Handbook. Humana Press, a part of Springer Science+Business Media, LLC. 2nd ed.2008 (<a href="https://moodle.ufsc.br/pluginfile.php/1376620/mod_resource/content/0/7170_Molecular%20Biomethods.pdf">https://moodle.ufsc.br/pluginfile.php/1376620/mod_resource/content/0/7170_Molecular%20Biomethods.pdf</a>)</p>
7.Remarks	<p>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 Center for genetic, Laboratory for Molecular medicine. Department of Medical Biochemistry</p> <p>Consultations: each working day: 1-2 p.m. at the Department with prior announcement via e-mail: <a href="mailto:emina.kiseljakovic@mf.unsa.ba">emina.kiseljakovic@mf.unsa.ba</a></p>

<b>COURSE PLAN:</b>	<b>MOLECULAR MEDICINE</b>	<b>Hours</b>
<b>Monday</b>	<b>Lecture:</b> Nucleic acid - structure and role; replication, transcription, translation. Basis of inheritance and mutations.	2
	<b>Lecture:</b> Molecular medicine techniques – basic terms and principles	2
	<b>Practical laboratory work:</b> Basic procedures in molecular laboratory – equipment use, sterility and safety procedures, waste disposals	2
<b>Tuesday</b>	<b>Lecture:</b> Monogenic diseases – (Huntington disease, Cystic fibrosis, Muscular dystrophies, hemophilia); Mitochondrial diseases (MERRF and MELAS).	2
	<b>Practical laboratory work:</b> Salting out procedure for Extracting DNA (human nucleated cells)	2
	<b>Practical laboratory work:</b> Principles and medical application of the Polymerase Chain Reaction (PCR)	4
<b>Wednesday</b>	<b>Lecture:</b> Polygenic and Multifactorial diseases (common diseases – Diabetes mellitus, Hypertension, Coronary artery disease, Schizophrenia)	2
	<b>Practical laboratory work:</b> RFLP (restriction fragment length polymorphism) – technique for genetic variation detection.	2
	<b>Colloquium I + II</b>	
	<b>Practical laboratory work:</b> Gel electrophoresis for the separation of DNA fragments	2
<b>Thursday</b>	<b>Lecture:</b> Screening for Genetic diseases (carrier testing, presymptomatic testing). Prenatal, neonatal screening. Regenerative medicine	2
	<b>Practical laboratory work:</b> Western blot technique for protein analysis	2
	<b>Colloquium III</b>	
	<b>Practical laboratory work:</b> Quantitative protein determination by Enzyme-linked immunosorbent assay (ELISA)	2
<b>Friday</b>	<b>Colloquium IV</b>	2
	<b>Partial exam</b>	2
<b>17.-18. week</b>	<b>Final exam (regular examination term)</b>	
<b>19.-20. week</b>	<b>Final exam (make-up examination term)</b>	
<b>September</b>	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0507</b>		Course title: <b>ROLE OF RESPIRATORY CHAIN</b>	
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the Study regulation</b>		
Lecturers: Associate Professor Emina Kiseljaković MD PhD, Associate Professor Radivoj Jadrić MD PhD, Associate Professor Sabaheta Hasić MD PhD, Assistant Lejla Alić MD, Assistant Amila Kulo MD			
1. Overall aim	The overall aim of the course is to raise the comprehension about influence of mitochondrial respiratory chain function in maintenance of cellular energy but also in wide variety of the diseases.		
2. Course contents	<p>The following topics will be covered in the Modules:</p> <p><b>Module 1. Cellular respiration phases</b> Aim of the module is to expand knowledge about energy production in the form of adenine triphosphate through aerobic metabolic pathways: glycolysis, Krebs-Citric Cycle and Electron Transport Chain</p> <p><b>Module 2. Respiratory chain functioning</b> Aim of the module is to introduce specific respiratory chain complexes structure, chemiosmotic theory and adenosine triphosphate synthesis to students</p> <p><b>Module 3. Mitochondrial Respiratory chain disorders</b> Aim of the module is to introduce consequences of defective oxidative phosphorylation in mitochondria to students. In addition, specific diagnostic procedures in recognition and detection of mitochondrial, multisystem diseases will be studied.</p>		
3. Learning outcomes (Knowledge, skills and competences)	<p>Student will acquire knowledge about synthesis of ATP and the consequences of energy disturbance in disease. They will be able to recognize the effect of respiratory chain disorders on the organism function. They will understand the involvement of mitochondrial dysfunction in clinically heterogeneous disease processes like neurodegeneration, ischemia, diabetes, cancer, metabolic diseases as well as the aging process.</p> <p><i>Trough the lectures the students will gain following knowledge and competences:</i></p> <ol style="list-style-type: none"><li>1. Expand knowledge of ATP generation during cellular respiration phases</li><li>2. Acquire knowledge of complex morphology and crucial role of respiratory chain in energy production in proper body function</li><li>3. Students will understand the clinical importance of failure of oxidative phosphorylation in mitochondria.</li></ol> <p><i>Trough the seminars students will acquire following skills:</i></p> <ul style="list-style-type: none"><li>– Recognition of complexity of gene encoding mitochondrial respiratory chain proteins</li><li>– Understanding that either the nuclear or the mitochondrial gene defects</li></ul>		

	causes impairment of respiratory chain complexes and ATP depletion. Recognizing diverse spectrum of clinical phenotypes caused by mutation in the nuclear or the mitochondrial genome: Leber hereditary optic neuropathy (LHON), Mitochondrial Encephalomyopathy with Lactic Acidosis and Stroke-like episodes (MELAS), Myoclonic Epilepsy with Ragged-Red Ribers (MERRF), Kearns-Sayre syndrome (KSS) and Chronic Progressive External Ophthalmoplegia (CPEO)												
4. Teaching methods	Lectures: 10 hours Seminars: 10 hours												
5. Method of knowledge assessment and examination	<p>Continuous assessment of the knowledge and skills (Midterm examination) will be carried out through Partial exam and "problem solving" seminars</p> <p><b>Seminar</b> Acquired skills in lectures and in advance prepared presentation of Clinical cases with mitochondrial disorders will be evaluated through 4 seminars. Student will be evaluated according to quality of presentation, contribution and knowledge. In order to pass each seminar, it is necessary to attain minimum of 7 points. Maximal score per seminar is 12,5 points.</p> <p><b>Partial exam</b> Knowledge acquired in modules 1., 2., and 3. will be evaluated using written test in the form of Multiple choice question (MCQ) containing 25 questions (maximum 50 points); the minimum level required to pass the test is 27 points (55%).</p> <p>Students who have successfully accomplished all of their obligations during the semester (attendance is within the legal limits) and who have passed partial exam and four seminars are not required to take Regular exam. Their final grade is reported according to points attained during Continuous knowledge assessment.</p> <p>Total score attained during continuous assessment</p> <table><tr><td></td><td>min</td><td>max</td></tr><tr><td>Seminar</td><td>28</td><td>50</td></tr><tr><td>Partial exam</td><td>27</td><td>50</td></tr><tr><td>Total</td><td>55</td><td>100</td></tr></table> <p><b>Regular examination term</b> Student is obliged to take regular exam if minimum points are not attained during continuous assessment for both seminar and theoretical parts of the course. Regular exam should be taken also if a student is not satisfied with the grade received during continuous assessment.</p> <p>Seminar will be taken before, but is not a prerequisite for theoretical exam. Test of acquired skills in seminar will be carried out in form of oral exam for each seminar that student failed (1-4) during continuous</p>		min	max	Seminar	28	50	Partial exam	27	50	Total	55	100
	min	max											
Seminar	28	50											
Partial exam	27	50											
Total	55	100											

	<p>assessment. Theoretical exam consists of 25 MCQs.</p> <p><b>Re-sit examination term /September examination term</b> Previously defined criteria will be applied also in Re-sit and September examination terms.</p> <p><b>Grading system and grading points</b> 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>&lt;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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7. Remarks	<p>Student attendance is regulated by the Law of Higher Education of Sarajevo Canton. Student absence should be justified by valid documentation. Lectures and seminars will be held at the Department of Medical Biochemistry.</p> <p>Department of Medical Biochemistry Consultation: working days: 1-2 p.m. at the Department with prior announcement via e-mail <a href="mailto:emina.kiseljakovic@mf.unsa.ba">emina.kiseljakovic@mf.unsa.ba</a></p>																					



## COURSE PLAN: ROLE OF THE RESPIRATORY CHAIN

		Hours
Monday	<b>Lecture:</b> Electron transport chain and cellular respiration	2
	<b>Lecture:</b> Respiratory chain complexes – structure and function. Chemiosmotic theory	2
Tuesday	<b>Lecture:</b> Adenosine triphosphate synthesis	2
	<b>Lecture:</b> Causes and consequences of respiratory chain dysfunction	2
Wednesday	<b>Seminar:</b> Genetic defect as causes of mitochondrial respiratory chain dysfunction. Clinical aspects and molecular genetics testing for diagnosis of mitochondrial diseases	2
	<b>Seminar:</b> Kearns-Sayre Syndrome (KSS) with chronic progressive external ophthalmoplegia – CPEO – causes, clinical, biochemical and morphological characteristics and diagnosis	2
Thursday	<b>Seminar:</b> Mitochondrial Encephalomyopathy Lactic Acidosis and Strokelike Episodes (MELAS) - causes, clinical, biochemical and morphological characteristics and diagnosis	2
	<b>Seminar:</b> Myoclonic Epilepsy and Ragged-Red Fiber Disease (MERRF) - causes, clinical, biochemical and morphological characteristics and diagnosis. Western blot technique for protein analysis	2
Friday	<b>Seminar:</b> Evaluation of gained knowledge, and skills, discussion about diagnosis of patients (problems) and possible therapy and prevention	2
	<b>Partial exam</b>	2
17.-18. week	<b>Final exam (regular examination term)</b>	
19.-20. week	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0508</b>	Course title: <b>Doping and Anti-doping</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Lecturers: <b>Assistant Professor Aida Kulo Ćesic MD PhD, Full Professor Svjetlana Loga-Zec MD PhD, Associate Professor Jasna Kusturica MD PhD, Associate Professor Maida Rakanović-Todić MD PhD, Assistant Professor Lejla Burnazović-Ristić MD PhD, Assistant Sanita Maleškić MD</b>			
Prerequisites: <b>According to the study regulation</b>			
1. Overall aim	The overall aim of the Doping and Anti-Doping Course is to gain an understanding of substance abuse and the methods of doping as well as anti-doping measures and mechanism of control.		
2. Course contents	The following topics will be covered within the Modules: Module 1. Doping: Abuse of pharmacologically active substances in sports Module 2. Anti-Doping Control Module 3. Anti-Doping Program		
3. Learning outcomes	Students will acquire knowledge necessary for understanding application of pharmacologically active substances in sports and sufficient methods to prevent their abuse. <i>Through the lectures and seminars, the students will gain following knowledge and competences:</i> 1. Understand the tasks and organization of the system for combating doping. 2. Understand the list of banned substances and the anti-doping control procedure. 3. Understand the basic properties of pharmacologically active substances and the methods used in sports to improve performance. <i>Through the practical work students will acquire following skills:</i> - Counseling regarding the use of pharmacologically active substances in sports - Identification of adverse effects of pharmacologically active substances which are used as doping agents - Procedures in the doping control of athletes		
4. Teaching methods	Lectures: 10 hours  Seminars: 10 hours		
5. Method of knowledge assessment and examination	Continuous knowledge and skills assessment will be carried out through participation in debates, PBL sessions and Partial exam in the form of written test with extended response questions (ERO)  <b>Continuous assessment of knowledge:</b>  <b>Participation in the debate</b> (each student participates in one debate). For a successful debate: minimum 10 points; maximum 20 points.  Criteria for scoring participation in debate:		

	<p>- preparation: up to 5 points (scored by students within the group)</p> <p>- presentation: up to 5 points</p> <p>- answers: up to 10 points</p> <p><b>PBL sessions</b> (each student participates in two sessions), one session carries 15 points. For successful PBL sessions: minimum 17 points; maximum 30 points.</p> <p>Criteria for scoring participation in PBL session:</p> <p>- team work (cooperation, support, assistance): up to 3 points</p> <p>- contribution to problem solving: up to 6 points</p> <p>- presentation and discussion: up to 6 points</p> <p><b>Partial exam</b> (written test of knowledge with ERO for modules 1-3): for a successful test: maximum 50 points, minimum 28 points.</p> <p>Criteria for scoring the ERO test: up to 5 points per question/answer.</p> <p><b>Final exam</b></p> <p>For students who did not pass any of the parts of a continuous knowledge and skills assessment.</p> <p>Knowledge covered by the debate or PBL session will be examined in writing (essay) and the rest will be examined by written test of knowledge with ERO.</p> <p>The final grade is formed by summing up all the points earned for each form of knowledge checking (minimum 55, maximum 100 points).</p>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> <li>– Rang HP, Dale MM, Ritter JM, Flower JR, Henderson G. Pharmacology. 7th edition, Elsevier Inc; 2012.</li> <li>– Bowers DL, Hildebrand LR et al. Guide to Prohibited Substances and Prohibited Methods of Doping. United States Anti-Doping Agency; 2007.</li> </ul>
7. Remarks	<p>The maximum number of students to attend the course is 20.</p> <p>Consultations will be possible every day from 12 to 13 h., with advance notice to the secretary of the Department or by e-mail: farmakologija@mf.unsa.ba</p> <p>In case of absences from teaching, the procedure defined by actual legal regulations will be followed.</p>

## COURSE PLAN: DOPING AND ANTIDOPING

week	Lecture/Practical
<b>6</b>	<b><u>Module 1. Lecture, 2 hours:</u></b> Definition of doping; World Anti-Doping Code; International Standards; Model Solutions and Guidelines; Violation of anti-doping rules; World Anti-Doping Agency; Antidoping agency of B&H. List of Prohibited substances. Control of Prohibited Pharmacologically Active Substances (Testing and Sanctions)
<b>7</b>	<b><u>Module 3. Lecture, 2 hours:</u></b> Anabolics and their abuse in sports
<b>8</b>	<b><u>Module 3. Practical, 2 hours:</u></b> Debate: Supplements in sports: pros and cons
<b>9</b>	<b><u>Module 2. Lecture, 2 hours:</u></b> Peptide hormones and glucocorticoids and their abuse in sports
<b>10</b>	<b><u>Module 2. Practical, 1 hour</u></b> PBL: Peptide hormones and glucocorticoids and their abuse in sports
<b>11</b>	<b><u>Modul 4. Lecture, 2 hours:</u></b> Stimulants and their abuse in sports
<b>12</b>	<b><u>Module 4. Practical, 2 hours:</u></b> PBL: Stimulants and their abuse in sports
<b>13</b>	<b><u>Module 5. Lecture, 2 hours:</u></b> Diuretics and thyroid hormones and their abuse in sports; Genetic doping
<b>14</b>	<b><u>Module 1. Practical, 2 hours:</u></b> Debate: doping in sports: pros and cons Anti-doping strategy in sports
<b>15</b>	<b>PARTIAL EXAM</b>
<b>17/18</b>	<b>Final exam (regular examination term)</b>
<b>19/20</b>	<b>Final exam (make-up examination term)</b>
<b>September</b>	<b>Final exam (September examination term)</b>

Code: <b>MFSE 0509</b>		Course title: <b>DIAGNOSTIC LABORATORY PROCEDURES IN PATHOLOGY</b>	
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS : <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the Study Regulation</b>		
Lecturers: <b>Svjetlana Radović, MD, PhD, professor of pathology</b> <b>Suada Kuskunović-Vlahovljak, MD, PhD, assistant professor of pathology</b> <b>Edina Lazović Salčin, MD, PhD, assistant professor of pathology</b> <b>Nina Čamdžić, MD, teaching assistant</b>			
1. Overall aim	The overall aim of the course is to provide the students with knowledge about the standard and modern diagnostic procedures used in pathological diagnostics, which are also indispensable in everyday clinical practice.  The purpose of the subject is further education of students about the importance, manner of performing and interpreting diagnostic methods, such as cytodiagnostics or highly sophisticated methods as immunohistochemistry and some methods in molecular pathology.		
2. Course contents	The following topics will be covered during the Modules:  <b>Module 1. Morphological methods</b> <b>Module 2. Diagnostic cytology</b> <b>Module 3. Immunohistochemistry</b> <b>Module 4. Molecular diagnostic techniques</b>		
3. Learning outcomes (knowledge, skills and competence)	<i>Through the lectures of Diagnostic laboratory procedures in pathology course students will gain following <b>knowledge</b>:</i>  <b>Module 1. Morphological methods</b> The aim of the module is to familiarize students with the methods of sampling biopsies, preparing and storing bioptic material.  <b>Module 2. Diagnostic cytology</b> The aim of the module is to familiarize students with types of cytological smears, ways of staining smears, cytodiagnostics of genital and respiratory tract, as well as thyroid cytodiagnostics.  <b>Module 3. Immunohistochemistry</b> The aim of the module is to familiarize students with the immunohistochemical procedure, in order to gain insight into sample preparation, sample labeling, some of the diagnostic markers, the manner of their expression and interpretation of the findings.  <b>Module 4. Molecular diagnostic techniques</b> The aim of the module is to familiarize students with the importance of molecular testing as an important part in		

	<p>diagnosis, monitoring disease and therapy decision making for individual patients. The task is also to gain insight into performing and interpreting the findings of molecular techniques.</p> <p><i>Through the lectures and practical work of above listed modules students will acquire following</i></p> <p><b>knowledge about:</b></p> <ul style="list-style-type: none"> <li>- methods of sampling, storing and transporting bioptic material</li> <li>- the importance of application of different methods of staining in cytopathological diagnostics</li> <li>- basics of immunohistochemical procedures</li> <li>- basics of molecular pathology techniques</li> </ul> <p><b>skills:</b></p> <ul style="list-style-type: none"> <li>- to fill in referral paperwork for biopsy samples,</li> <li>- to obtain necessary clinical data for referred biopsy samples,</li> <li>- to interpret histopathology reporting</li> <li>- to interpret basic IHC and molecular findings</li> </ul>
4. Teaching methods:	<p><b>Lectures: 10 hours</b></p> <p><b>Practical work: 10 hours</b></p>

<p>5. Methods of knowledge assessment and examination</p>	<p>Knowledge and skills are evaluated continuously during the semester.</p> <p>Students are required to take a part in all forms of evaluation during the semester.</p> <p><b>Partial exam 1 (M 1-2)</b></p> <p>Partial exam 1 is in a written form with 20 multiple choice questions (MCQ) which comprise topics from Modules 1 and 2. Each correct answer is worth 2 points. The grading scale has a maximum of <b>40 points</b>. To pass the exam, the student must meet the minimum criteria by scoring <b>22 points</b>.</p> <p><b>Partial exam 2 (M 3-4)</b></p> <p>Partial exam 2 is in a written form with 30 MCQ which comprise topics from Modules 3 and 4. Each correct answer is worth 2 points. The grading scale has a maximum of <b>60 points</b>. To pass the exam, the student must meet the minimum criteria by scoring <b>33 points</b>.</p> <p><b>Final exam</b></p> <p>If the student did not complete Partial exam 1 or 2 during continued evaluation the same takes in final exam as it follows:</p> <ul style="list-style-type: none"> <li>• <b>20 MCQ for Module 1-2 (M1-2).</b> Each correct answer is worth 2 points. The grading scale has a maximum of <b>40 points</b>. To pass the exam student must meet minimal criteria by scoring <b>22 points</b>.</li> <li>• <b>30 MCQ for Module 3-4 (M3-4).</b> Each correct answer is worth 2 points. The grading scale has a maximum of <b>60 points</b>. To pass the exam student must meet minimal criteria by scoring <b>33 points</b>.</li> <li>• <b>50 MCQ for Module 1-4 (M1-4).</b> Each correct answer is worth 2 points. The grading scale has a maximum of <b>100 points</b>. To pass the exam student must meet minimal criteria by scoring <b>55 points</b>.</li> </ul> <p>Final exam is in written form as MCQ test. Students who are dissatisfied with gained number of points during the continuous examination can also take the final exam.</p> <p><b>Repeated/Re-sit exam</b></p> <p>Repeated/Re-sit exam is in written form as MCQ test. The repeated/re-sit exam takes place according to the previously defined criteria of the final exam.</p>
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	Final grade is determined based on the following criteria:		
	<b>Grade</b>	<b>Cumulative points</b>	<b>Definition</b>
	10 (A)	95-100	Outstanding performance with only minor errors
	9 (B)	85-94	Above the average standard but with some errors
	8 (C)	75-84	Average, with noticeable errors
	7 (D)	65-74	Fair but with significant shortcomings
	6 (E)	55-64	Performance meets the minimum criteria
	5(F, FX)	<55	Fail (some/considerable further work is required)
6. Literature:	<b>Obligatory:</b> <ul style="list-style-type: none"> <li>– Kumar V, Abbas AK, Aster JC. Robbins &amp; Cotran Pathologic Basis of Disease, 9th ed. Elsevier; 2015.</li> <li>– Handouts of the Department of Pathology</li> </ul>		
7. Remarks:	<p>The maximum number of students attending lectures is 30. Consultations with teaching personnel are possible every working day.</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 via e-mail: <a href="mailto:suada.kuskunovic@mf.unsa.ba">suada.kuskunovic@mf.unsa.ba</a></p>		



## DIAGNOSTIC PATHOLOGY AND LABORATORY PROCEDURES

Week	Form of teaching	Hours
Week 1.	<b>Lecture:</b> Biopsy and types of biopsies; methods of macroscopic examination of surgical biopsies, methods of tissue preparation for microscopic analysis, biopsy protocols  <b>Practical work:</b> Pathohistological laboratory: Preparation of tissue for pathohistological procedure	1  1
Week 2.	<b>Lecture:</b> Diagnostic cytology – cytopathology of normal and abnormal cells. Cytopathology of inflammatory, premalignant and malignant changes.  <b>Practical work:</b> Microscopic examination of cytological smear	1  1
Week 3.	<b>Lecture:</b> Cytopathology of the female genital tract - cervicovaginal smear  <b>Practical work:</b> Microscopic examination of cytological smear	1  1
Week 4.	<b>Lecture:</b> Cytopathology of the respiratory tract  <b>Practical work:</b> Microscopic examination of cytological smear	1  1
Week 5.	<b>Lecture:</b> Cytopathology of thyroid gland  <b>Practical work:</b> Microscopic examination of cytological smear	1  1
Week 6.	<b>Lecture:</b> Immunohistochemistry (IHC): basic principles of the method; the subcellular level structures that are discovered by this method and ways of presenting proteins in certain types of tissue <b>Practical work:</b> Laboratory for immunohistochemistry-equipment, tissue preparation  <b>First partial exam (M 1-2)</b>	1  1
Week 7.	<b>Lecture:</b> Immunohistochemistry: The most commonly used diagnostic markers for detection of tissue origin, IHC algorithms, and practical application of the method.  <b>Practical work:</b> demonstration of the IHC procedure	1  1
Week 8.	<b>Lecture:</b>	

	Immunohistochemistry: basics of evaluation and interpretation of findings  <b>Practical work:</b> Interpretation of the findings on common disease examples	1  1
Week 9.	<b>Lecture:</b> Molecular pathology: the task and role of molecular pathology in modern medicine  <b>Practical work:</b> Laboratory of molecular pathology-equipment, tissue preparation	1  1
Week 10.	<b>Lecture:</b> Molecular pathology: most commonly used molecular methods with examples of practical application, basics of interpretation  <b>Practical work:</b> Laboratory of molecular pathology–interpretation of analyses on common disease examples  <b>Second partial exam (M 3-4)</b>	1  1
Week 17.-18	<b>Final exam (regular examination term)</b>	
Week 19-20.	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0510</b>	Course title: <b>FOOD SAFETY AND HEALTH</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>V</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the Study Regulation</b>		
Lecturers: Associate Professor Amra Čatović MD PhD			
1. Overall aim	The overall aim of the Food Safety and Healthcourse is to give students a basic knowledge of the role of food safety in public health and the role ofprocesses needed for ensuring a safe food supply.		
2. Course contents	The following topics will be covered during the Modules: Module 1. The concept of food safety Module 2. Food service inspections, food safety in the home Module3.Hormones and antibiotics contamination Module 4.Organic food, chemical contamination of food, genetically modified foods		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge necessary for understandingthe issues regarding food safety, globalization of the food supply, sustainable agriculture, and biotechnology.</p> <p>They will be able to identify the major risk factors and health related consequences of food borne illness. They will gain knowledge about the basic principles of the food safety management practices such as Hazard Analysis Critical Control Points (HACCP), public health policies, riskassessment, sanitation, pathogen and allergen controls in foods.</p> <p>Students will become aware of foundations of conflict between the preferences of international organizations, private companies, national government organizations, social entrepreneurs, and humanitarian relief agencies and will be able to participate in interdisciplinary approach to solve problems addressed to public health issues associated with exposures to unsafefood supply.</p> <p>Through practical work students will explore typically components of food safety systems, although the components and priorities of food safety system may vary from country to country.</p> <p><i>Through the lectures the students will gain following knowledge and competences to:</i></p> <ol style="list-style-type: none"><li>1. Be familiar with food safety as environmental health challenge. Identify the role of cultural and/or religious background of food behaviors.</li><li>2. Know basic principles of different areas of food safety: pesticide and antibiotic residues, the presence of mycotoxins and foodborne pathogens, and all aspects of food production and preparation.</li><li>3. Identify the trends in agricultural trade. Understand the environmental sustainability of different food and farming systems and be aware of changes in environmental health risk factors associated with agricultural development.</li><li>4. Identify policy issues related to the food supply. Describe the responsibilities, interactions, and limitations of international, and local agencies responsible for food safety.</li><li>5. Describe the food safety requirements for food services. Identify</li></ol>		

	<p>the issues related to optimum food safety in the home. Recognize the role of time, temperature, cross contamination, and personal hygiene in food safety.</p> <p><i>Through the practical work students will acquire following skills to:</i></p> <ul style="list-style-type: none"><li>- Apply food laws and regulations</li><li>- Participate in food control management</li><li>-Act according the results of laboratory services for food monitoring</li><li>- Know to inform about the issues regarding food safety</li></ul>																					
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 Term Project (designed to educate specific group on and food safety 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. 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>&lt; 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
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6 (E)	55-64	Meets minimal criteria																				
5 (F, FX)	< 55	Fails to meet minimal criteria																				
6. Literature	Required Frumkin H. Environmental Health: From Global to Local. Jossey-Bass.																					

	San Francisco, 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.</p> <p>Consultation hours are every day 12.00-13.00 with prior announcement by email: <a href="mailto:amra.catovic@mf.unsa.ba">amra.catovic@mf.unsa.ba</a></p>

## COURSE PLAN: FOOD SAFETY AND HEALTH

<b>Days</b>	<b>Form of Instructions and materials</b>	<b>Number of classes</b>
Monday	<p><b><u>Lecture:</u></b></p> <p>Course Introduction: Food and Nutrition Security, Safety, and Public Health Understanding the influence of globalization and urbanization on food systems (food supply, marketing, and distribution)<sup>[SEP]</sup>and nutrition security (food consumption patterns, and on nutrition and health outcomes)<sup>[SEP]</sup></p> <p><b><u>Practical laboratory work:</u></b></p> <p>Intersectional cooperation and whole-food chain approaches - principles of the food safety management practices such as Hazard Analysis Critical Control Points (HACCP)</p>	<p>2</p> <p>3</p>
Tuesday	<p><b><u>Lecture:</u></b></p> <p>Foodborne diseases in the 21 Century</p> <p>- An overview of dynamics of infectious foodborne illness including: industrialization, globalization, natural disasters, antimicrobial resistance pressures, population mobility, aging, and dietary changes, as well as the implications for surveillance of foodborne disease</p>	4
Wednesday	<p><b><u>Lecture:</u></b></p> <p>Chemical risks to food safety</p> <p>The green revolution</p>	4
Thursday	<p><b><u>Practical laboratory work:</u></b></p> <p>Term project</p> <p>Foodborne disease outbreak investigation methods: E. coli O157:H7 as a model of an emerging foodborne pathogen, organic food, chemical contamination of food, genetically modified food,</p>	5
Friday	<p><b><u>Practical laboratory work: 1 hours</u></b></p> <p>Food safety information/communication to the public and target groups</p>	2
Weeks 17/18	<b>Final exam (regular examination term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

<b>SIXTH (SUMMER) SEMESTER</b>						
<b>Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>S</b>	<b>TCH</b>	<b>ECTS</b>
MFSE 0601	<b>Pathology 2</b>	60	45	30	135	10
MFSE 0602	<b>Patophysiology 2</b>	30	30	15	75	5
MFSE 0603	<b>Pharmacology and Toxicology 2</b>	32	30	13	80	5
MFSE 0604	<b>Medical Microbiology 2</b>	30	30		60	4
MFSE 0605	<b>Clinical Propedeutics</b>	22	43		65	4
MFSE 0606	<b>Physics of Medical Diagnostics</b>	12	8		20	2
MFSE 0607-0615	<b>Elective Course 1</b>	10	10		20	1
	<b>TOTAL</b>	<b>196</b>	<b>196</b>	<b>88</b>	<b>450</b>	<b>30</b>

INTERNSHIP (FAMILY MEDICINE)*	Total hours: <b>120</b>
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\*ECTS credits and Code will be assigned after completed Clinical Rotation: Family Medicine (VI study year)

#### **Elective Courses:**

MFSE 0607    **Clinical Pathology of Selected Organ Systems**

MFSE 0608    **Foodborne Disease**

MFSE 0609    **Microbiological Diagnostic Techniques**

MFSE 0610    **Physics of Nuclear Medicine**

MFSE 0611    **Psychoactive Substance Abuse**

MFSE 0612    **Sexually transmitted diseases**

MFSE 0614    **Oxidative Stress in Human Pathophysiology**

MFSE 0615    **Immunogenetics**

Code:MFSE 0601	Course title: PATHOLOGY 2		
Level: Preclinical	Study year: III	Semester: VI	ECTS : 10
Status: Obligatory	Total contact hours: 135		
Prerequisites:	According to the Study Regulation		
Lecturers: Svjetlana Radović, MD, PhD, professor of pathology Suada Kuskunović-Vlahovljak, MD, PhD, assistant professor of pathology Edina LazovićSalčin, MD, PhD, assistant professor of pathology Nina Čamdžić, MD, teaching assistant			
1. Overall aim	The overall aim of the Pathology 2 course is to provide students'knowledge about mechanisms of cells, tissues and organs damage and to introduce them to the morphological and molecular changes that are basis of the disease or which appear because of the disease.		
2. Course contents	The following topics will be covered during the Modules:  Module 1. Blood vessels Module 2. Heart Module 3. Hematopoietic and lymphatic system Module 4. Gastrointestinal tract Module 5. Liver and biliary tract Module 6. Exocrine and endocrine pancreas Module 7. Respiratory system Module 8. Kidneys and urinary tract Module 9. Female genital tract and breast Module 10. Male genital tract Module 11. Endocrine system disorders Module 12. Central and peripheral nerve system pathology Module 13. Muscle, joint and bone system pathology Module 14. Skin pathology		
3.Learning outcomes (knowledge, skills and competence)	The task of the Course is to enable the students to recognize morphological changes in the cells, tissues and organs, based on the acquired theoretical knowledge during lecturesand seminars, as well as to gain their own experience analyzing macroscopic specimens and microscopic tissue samples.  The acquired knowledge and skills should enable better understanding causes and mechanisms of disease and to facilitate gaining knowledge of the functional consequences of the morphological changes.  The task of Pathology 2 course is also, as a clinical-theoretical subject, to connect the previous basic study courses, studying structure and function of normal human body, with clinical disciplines. The contents of the Pathology 2 course represents the basis for the study of all clinical courses. American-English clinician William Osler is a creator of common saying: “What is our pathology knowledge like, that will form our clinical practice”.		



Students will gain inside, through the lectures of this course, that contents of this course is a basis for the other clinical courses studies; that pathology is also clinical science, that pathologists not only diagnose the disorder but also suggest therapy and predict the disorder prognosis, and pathohistological reports are used for the purpose of treatment and prognosis of disorders.

*Through the lectures of Pathology 2 course students will gain following knowledge about diseases of certain organic systems:*

**Module 1. Blood vessels**

Disorders of arteries (arteriosclerosis, vasculitis, Raynaudphenomenon, aneurysms), venous disorders (varicosities, phlebothrombosis, thrombophlebitis, superior and inferior vena cava syndrome) and lymphatic vessels (lymphangitis, lymphedema), tumors of blood vessels (hemangioma, hemangioendothelioma, glomangioma, Kaposi sarcoma);

**Module 2. Heart**

Hereditary and acquired disorders of heart-congestive heart failure, ischemic heart disease, hypertensive heart disease, pulmonary heart disorder, congenital disorders, endocardial and valvular disorders, myocardial and pericardial disorders and some other;

**Module 3. Hematopoietic and lymphatic system**

Disorders of white and red blood cell lineage, disorders causing hemorrhage, spleen disorders;

**Module 4. Gastrointestinal tract**

Inflammatory and tumor processes of oral cavity, esophagus, stomach, small and large intestines;

**Module 5. Liver and biliary tract**

Disorders and tumors of liver and biliary tract;

**Module 6. Exocrine and endocrine pancreas**

Pancreas inflammatory disorders, tumors of exocrine and endocrine pancreas, Diabetes mellitus;

**Module 7. Respiratory system**

Obstructive and restrictive disorders of lungs, vascular disorders of lung, lung infections and tumors;

**Module 8. Kidneys and urinary tract**

The disorders of glomeruli, tubules, renal interstitial, disorders of blood vessels, renal tumors and its collecting system;

**Module 9. Female genital tract and breast**

The most common anomalies of development, disorders and tumors of female genital system (vulva, vagina, uterine cervix and corpus), diseases

	<p>of pregnancy, inflammation and disorders of the breast, breast tumors;</p> <p><b>Module 10. Male genital tract</b> The most common forms of developmental and acquired anomalies and disorders of male genital system;</p> <p><b>Module 11. Endocrine system disorders</b> Disorders and tumors of endocrine system (hypophysis, thyroid gland, parathyroid gland, cortex and medulla of adrenal gland);</p> <p><b>Module 12. Central and peripheral nerve system pathology</b> Inflammation, trauma, vascular disorder, degenerative disorders and tumors of central and peripheral nervous system;</p> <p><b>Module 13. Muscle, joint and bone system pathology</b> The most common disorders and tumors of bones, joints, skeletal and smooth muscles.</p> <p><b>Module 14. Skin pathology</b> The most common skin disorders including inflammatory dermatoses, blistering disorders and skin tumors (benign and malignant)</p> <p><i>Through the lectures of above listed modules and practical work of Pathology 2 students will acquire following <b>skills</b>:</i></p> <ul style="list-style-type: none"> <li>-to observe and recognize pathological changes on microscopic level,</li> <li>-independently draw pathological lesions,</li> <li>-independently mark parts of structures in histopathological slides,</li> <li>-to notice macroscopically and recognize pathological nature of changes,</li> <li>-referring biopsy samples,</li> <li>-filling in referral paperwork for biopsy samples,</li> <li>-fill in necessary clinical data for referred biopsy samples,</li> <li>-to use developmental and visible general pathology processes in any organ system,</li> <li>-to notice and respect that all organ systems are not equally affected with a pathological process,</li> <li>-to respect that clinical features of a process can be different from a person to another person,</li> <li>-to discover the essence of pathological process,</li> <li>- to link etiology, morphology and clinical presentation in the most common disorder.</li> </ul>
4. Teaching methods:	<p><b>Lectures: 60 hours</b></p> <p><b>Seminars:30 hours</b></p> <p><b>Practical work: 45 hours</b></p>
5. Methods of knowledge	<p>Knowledge and skills are evaluated continuously during the semester. Students are required to take a part in all forms of evaluation during the</p>

assessment and examination	<p>semester.</p> <p><b>Histopathology examination -Pathology 2</b></p> <p>The evaluation scale has a maximum of <b>10 points</b>. Minimal requirement for completing this part of exam is scored <b>6 points</b>. The student gets 5 microscopic slides, each is worth 2 points. Student needs to recognize the lesion, write the correct diagnosis in Latin and correctly describe the morphological changes.</p> <p><b>Macroscopic diagnostics</b></p> <p>The exam is oral. The grading scale has a maximum of <b>10 points</b>, and the minimum criteria for a successful evaluation are <b>6 points</b>. The student receives 2 macroscopic (gross) tissue samples. Each is worth <b>5 points</b>. The gross findings should be properly described and given an accurate diagnosis or differential diagnosis.</p> <p><b>Partial exam 1 (M 1-6)</b></p> <p>Partial exam 1 is designed as an essay. The grading scale has a maximum of <b>30 points</b>. To pass the exam, the student must meet the minimum criteria and score <b>16.5 points</b>. The essay has 3 questions which comprise topics from Modules 1-6. Since each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) for each question.</p> <p><b>Partial exam 2 (M 7-14)</b></p> <p>Partial exam 2 is designed as an essay. The grading scale has a maximum of <b>50 points</b>. To pass the exam, the student must meet the minimum criteria and score <b>27.5 points</b>. The exam consists of 5 questions, including material from Modules 7-14. Each question is worth <b>10 points</b>. It is necessary to give a positive answer (minimum of 5.5 points) for each question.</p> <p><b>Final exam</b></p> <p>If the student did not complete one of the forms of continued evaluation during the semester, the same takes in final exam as it follows:</p> <ul style="list-style-type: none"> <li>• <b>5 microscopic slides for histopathology examination</b>, each worth 2 points with maximum score of 10 points. Minimal requirement for completing this part of exam is 6 points. The student needs to recognize the lesion, write the correct diagnosis in Latin and correctly describe morphological changes.</li> <li>• <b>2 macroscopic (gross) tissue samples</b>. Each is worth 5 points. Gross findings should be correctly described, and correct diagnosis or a differential diagnosis should be given. Grading scale has a maximum of 10 points, and the minimum criteria for a successful evaluation is 6 points.</li> <li>• <b>3 essay questions for Module 1-6 (M1-6)</b>, each worth 10 points. The grading scale has a maximum of 30 points. To pass the exam</li> </ul>
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student must meet minimal criteria by scoring 16.5 points. Since each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) on each question.

- **5 essay questions for Module 7-14 (M7-14)**, each worth 10 points. The grading scale has a maximum of 50 points. To pass the exam, the student must meet the minimum criteria and score 27.5 points. As each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) on each question.
- **8 essay questions for Module 1-14 (M1-14)** - if the student did not complete partial exam 1 and 2. Each question is worth 10 points. The grading scale has a maximum of 80 points. To pass the exam student must meet minimal criteria by scoring 44 points. Since each question includes one module (topic), it is necessary to give a positive answer (at least 5.5 points) on each question.

**NOTE:** For student who did not complete partial exams, final exam is integral, i.e. failure in one segment is eliminatory.

Final exam is in written form. Students who are dissatisfied with gained number of points during the continuous examination can also take the final exam.

### **Repeated/Re-sit exam**

Repeated/Re-sit exams are in written form. The repeated exam takes place according to the previously defined criteria of the final exam (referring to the number of questions for the macroscopic diagnostics, the number of questions per module and scoring systems for individual segments of the written exam).

Final grade is determined based on the following criteria:

Grade	Cumulative points	Definition
10 (A)	95-100	Outstanding performance with only minor errors
9 (B)	85-94	Above the average standard but with some errors
8 (C)	75-84	Average, with noticeable errors
7 (D)	65-74	Fair but with significant shortcomings
6 (E)	55-64	Performance meets the minimum criteria

	5 (F, FX)	<55	Fail (some/considerable further work is required)
6. Literature:	<p><b>Obligatory:</b></p> <ul style="list-style-type: none"> <li>– Kumar V, Abbas AK, Aster JC. Robbins &amp; Cotran Pathologic Basis of Disease, 9th ed. Elsevier; 2015.</li> <li>– Handouts of the Department of Pathology (Histopathology handouts)</li> </ul> <p><b>Additional literature:</b></p> <ul style="list-style-type: none"> <li>– Klatt EC. Robbins and Cotran Atlas of Pathology, 3rd ed. Elsevier Saunders; 2014.</li> <li>– Damjanov I. Pathology for the health professions, 5th ed. Elsevier Saunders; 2016.</li> </ul>		
7. Remarks	<p>Consultations with teaching personnel are possible every working day. 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 via e-mail: <a href="mailto:suada.kuskunovic@mf.unsa.ba">suada.kuskunovic@mf.unsa.ba</a></p>		

## COURSE PLAN: PATHOLOGY 2

Week	Form of teaching	Hours
Week 1.	<p><b>Lecture:</b> Blood vessel disorders. Disorders of arteries: arteriosclerosis, atherosclerosis, aneurysms and dissection, Raynaud phenomenon. Disorders of veins: varicose veins, thrombophlebitis and phlebothrombosis; superior and inferior vena cava syndromes. Disorders of lymphatics: lymphangitis and lymphedema. Tumours of blood vessels</p> <p><b>Seminar:</b> Vasculitides</p> <p><b>Practical work:</b> Histopathology Exercise 1 Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>2 1</p>
Week 2.	<p><b>Lecture:</b> Heart disease: congestive heart failure; ischemic heart disease; hypertensive heart disease, cor pulmonale, valvular heart disease-endocardial disorders, myocardial disorders and myocarditis; pericardial disorders; Cardiac tumours</p> <p><b>Seminar:</b> Congenital heart disorders and cardiomyopathies</p> <p><b>Practical work:</b> Histopathology Exercise 2 Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>2 1</p>
Week 3.	<p><b>Lecture:</b> Hematopoietic and lymphatic system: Red cell disorders: haemorrhage, haemolytic anaemia; anaemia of diminished erythropoiesis, polycythaemia; White cell disorders: nonneoplastic disorders, neoplastic disorders of white cells, bleeding disorders – disseminated intravascular coagulation, thrombocytopenia, coagulation disorders, Spleen and thymus pathology</p> <p><b>Seminar:</b> Leukemias</p> <p><b>Practical work:</b> Histopathology Exercise 3 Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>2 1</p>
Week 4.	<p><b>Lecture:</b> Oral cavity and gastrointestinal tract. Oral cavity: oral ulcerative and inflammatory lesions, leucoplakia, proliferative and neoplastic lesions of oral</p>	<p>4</p>

	<p>cavity, diseases of salivary glands.  Esophagus: obstructive and vascular diseases, esophagitis, esophageal tumours.  Stomach: gastropathy, gastritis, gastric polyps and tumours.  Pathology of appendix. Large intestine: obstruction, vascular disorders, inflammatory disorders, neoplastic disease</p> <p><b>Seminar:</b> Inflammatory and neoplastic disorders of the small and large bowel</p> <p><b>Practical work:</b>  Histopathology Exercise 4  Macroscopic diagnostics:case study</p>	<p>2</p> <p>2</p> <p>1</p>
Week 5.	<p><b>Lecture:</b>  Liver pathology: jaundice and inherited metabolic liver disorders, cholestatic syndromes, infectious disorders, autoimmune hepatitis, drug and toxine induced liver injury, circulatory disorders, cirrhosis, liver failure, nodules and tumours.  Disorders of gall bladder and extrahepatic biliary tract: cholangitis and liver abscess, gallstone disease, cholecystitis, carcinoma of the extrahepatic bile ducts and papilla Vater;</p> <p><b>Seminar:</b> Tumours of the liver</p> <p><b>Practical work:</b>  Histopathology Exercise 5  Macroscopic diagnostics:case study</p>	<p>4</p> <p>2</p> <p>2</p> <p>1</p>
Week 6.	<p><b>Lecture:</b>  Pancreatic pathology: acute and chronic pancreatitis  Exocrine and endocrine pancreas</p> <p><b>Seminar:</b> Tumours of the pancreas</p> <p><b>Practical work:</b>  Histopathology Exercise 6  Macroscopic diagnostics:case study</p>	<p>4</p> <p>2</p> <p>2</p> <p>1</p>
Week 7.	<p><b>Lecture:</b>  Respiratory tract – childhood lung disease, atelectasis, obstructive and restrictive lung disorders, pulmonary disorders of vascular origin, pulmonary infections, lung tumours, pleural lesions, lesions of the upper respiratory tract</p> <p><b>Seminar:</b> Respiratory tract tumours (upper and lower)</p> <p><b>Practical work:</b></p>	<p>4</p> <p>2</p> <p>2</p>

	<p>Histopathology Exercise 7 Macroscopic diagnostics: case study</p> <p><b>First partial exam – Pathology 2 (M 1-6)</b></p>	1
Week 8.	<p><b>Lecture:</b> Kidney and its collecting system – clinical manifestations of renal disease, glomerular disease, diseases affecting tubules and interstitium, diseases involving blood vessels, cystic diseases of the kidney, urinary outflow obstruction, congenital and developmental anomalies, neoplasms.</p> <p><b>Seminar:</b> Glomerular diseases of the kidney; kidney tumours</p> <p><b>Practical work:</b> Histopathology Exercise 8 Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>2 1</p>
Week 9.	<p><b>Lecture:</b> Female genital system. Vulva: vulvitis, nonneoplastic epithelial disorders, cysts. Vagina: vaginitis, malignant neoplasms. Cervix: cervicitis, neoplasms. Uterus: endometritis, adenomyosis, endometriosis, abnormal uterine bleeding, proliferative lesions of endometrium and myometrium. Fallopian tubes. Ovaries: Follicle and luteal cysts, polycystic ovarian syndrome. Diseases of pregnancy: placental inflammations and infections, ectopic pregnancy, gestational trophoblastic disease.</p> <p><b>Seminar:</b> Ovarian tumours</p> <p><b>Practical work:</b> Histopathology Exercise 9 Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>2 1</p>
Week 10.	<p><b>Lecture:</b> Breast- fibrocystic change, inflammatory processes, tumours of the breast. Male breast. Male genital system and lower urinary tract- diseases of penis, scrotum, testis and epididymis. Disorders of prostate, ureter, bladder and urethra. Sexually transmitted diseases.</p> <p><b>Seminar:</b> Male genital tumours</p> <p><b>Practical work:</b> Histopathology Exercise 10 Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>2 1</p>



Week 11.	<p><b>Lecture:</b> Endocrine system – Disorders of pituitary gland, thyroid gland, parathyroid gland, endocrine pancreas, adrenal cortex and medulla, tumours.</p> <p><b>Seminar:</b> Endocrine tumours</p> <p><b>Practical work:</b> Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>3</p>
Week 12.	<p><b>Lecture:</b> Nervous system- Basic reactions of neurons and glial cells, pathophysiological complications, infections of the nervous system, cerebrovascular disorders, diseases of myelin, neurodegenerative diseases, genetic metabolic and acquired metabolic and toxic disturbances, tumours.</p> <p><b>Seminar:</b> The most common tumours of the brain</p> <p><b>Practical work:</b> Macroscopic diagnostics: case study</p>	<p>4</p> <p>2</p> <p>3</p>
Week 13.	<p><b>Lecture:</b> Bones – congenital and metabolic disorders of bone, infections, Paget disease, fibrous dysplasia, hypertrophic osteoarthropathy.</p> <p><b>Seminar:</b> Bone tumours</p> <p><b>Practical work:</b> Macroscopic diagnostics: case study</p> <p><b>Microscopic Examination (Histopathology 2)</b></p>	<p>4</p> <p>2</p> <p>3</p>
Week 14.	<p><b>Lecture:</b> Disorders of skeletal muscle – atrophy, myositis, dystrophy, myasthenia gravis, trichinosis. Joints: osteoarthritis, infectious arthritis, rheumatoid arthritis, Lyme arthritis, bursitis.</p> <p><b>Seminar:</b> Skeletal muscle and soft tissue tumours</p> <p><b>Practical work:</b> Macroscopic diagnostics: case study Macroscopic diagnostic exam</p>	<p>4</p> <p>2</p> <p>3</p>
Week 15.	<p><b>Lecture:</b> Disorders of skin – inflammatory dermatoses, blistering disorders.</p>	<p>4</p>

	<b>Seminar:</b> Skin tumours	2
	<b>Practical work:</b> Macroscopic diagnostic: case study	3
	<b>Second partial exam – Pathology 2 (M 7-14)</b>	
Week 17-18	<b>Final exam (regular examination term)</b>	
Week 19-20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0602</b>		Course title: <b>PATOPHYSIOLOGY 2</b>	
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>5</b>
Status: <b>obligatory</b>	Total contact hours: <b>75</b>		
Prerequisites:	<b>According to the Study Regulation</b>		
Lecturers: Assistant Professor Almir Fajkić MD PhD, and additional professors			
1. Overall aim	The aim of the Pathophysiology 2 course is to train medical students in acquiring knowledge and skills in the field of special pathophysiology, and to help students to understand the pathophysiological processes characteristic for individual functional units as well as for the whole organism.		
2. Course contents	Module 1. Pathophysiology of blood and haematopoietic organs Module 2. Pathophysiology of the cardiovascular system Module 3. Pathophysiology of the endocrine system Module 4. Pathophysiology of the respiratory system Module 5. Pathophysiology of the urinary system Module 6. Pathophysiology of the gastrointestinal system Module 7. Pathophysiology of the central and peripheral nervous system		
3. Learning outcomes (Knowledge, skills and competences)	<p>The purpose of the course is to enable students to recognize functional changes of tissues, organs and organ systems. The acquired knowledge will enable students to understand the etiology and pathogenesis of the disease. The knowledge of the Pathophysiology 2 will help students to master all clinical subjects.</p> <p><i>Through the lectures and seminars, the students will acquire the following knowledge and competences:</i></p> <p>1. Learn basic pathophysiological mechanisms of blood disorders.</p> <p>2. Develop basic knowledge about pathophysiological mechanisms of cardiovascular system disorders.</p> <p>3. Understand pathophysiological mechanisms of endocrine system disorders.</p> <p>4. Recognize main mechanisms of respiratory system disorders.</p> <p>5. Learn pathophysiological mechanisms of urinary system disorders.</p> <p>6. Understand basic pathophysiological mechanisms to recognize</p>		

	<p>gastrointestinal system disorders.</p> <p>7. Discover basic pathophysiological mechanisms of nervous system disorders.</p> <p><i>Through the practical laboratory work , the students will acquire the following skills:</i></p> <ul style="list-style-type: none"> <li>- Qualitative and quantitative disorders of red blood cells</li> <li>- Testing the regenerative ability of blood in anemia</li> <li>- Laboratory tests in the diagnosis of anemia</li> <li>- Qualitative and quantitative changes of erythrocytes in the peripheral blood: <ul style="list-style-type: none"> <li>• folate and iron deficiency anemia</li> <li>• aplastic and hemolytic anemia</li> </ul> </li> <li>- Tests for hemostatic system disorders</li> <li>- Qualitative and quantitative platelet disorders</li> <li>- Disorders of white blood cells</li> <li>- Functional testing of white blood cells: <ul style="list-style-type: none"> <li>• acute leukosis</li> <li>• chronic leukosis</li> </ul> </li> <li>-Functional testing of the uropoietic system: <ul style="list-style-type: none"> <li>• physical and chemical examination of urine</li> <li>• microscopic examination of urine sediment</li> <li>• tests for the assessment of individual kidney function, impaired concentration and dilution testing of renal clearance.</li> </ul> </li> <li>-Functional testing of the hepatobiliary system: <ul style="list-style-type: none"> <li>• determination of bilirubin in the blood</li> <li>• determination of biliary products in the urine</li> <li>• examination of metabolic functions of the liver</li> </ul> </li> <li>- Laboratory markers of acute conditions</li> </ul>
4. Teaching methods	<p>Lectures: 30 hours</p> <p>Seminars: 15 hours</p> <p>Laboratory practical work: 30 hours</p>
5. Method of knowledge assessment and examination	<p><b>Continuous knowledge assessment</b></p> <p><b>Seminars</b></p> <p>During the course duration the students will be tested several times. The maximum number of points is 5.</p>

**Practical work**

The verification of acquired skills through practical exercises will be carried out continuously through the two colloquia. The maximum number of points is 35:

Colloquium 1 - maximum 20 points; passing minimum 11 points.

Colloquium 2 - maximum 15 points; passing minimum 8,2 points.

The structure of the colloquium:

1. MCQ
2. Essays
3. Questions with amendments.

Each question is scored +1 or -1 point based on the correct or incorrect answer to the question.

The points from the colloquia are added to other points after both partial exams. The colloquia which student failed during the course, can be retaken on the final and the repeated exam.

**Partial exam 1**

The partial exam includes modules 1, 2, and 3, and is structured in two parts: the written and the oral parts. The written part is in the form of an MCQ test with 10 questions. Each question is scored +1 or -1 point based on the correct or incorrect answer to the question. The student can score the maximum of 10 points. A student who acquires 55% on the test takes an oral exam which consists of 3 questions. The maximum number of points on the oral exam is 20. Seminars are part of the test and the oral exam. The maximum number of points on the partial exam 1 is 30 (MCQ test 10 points + the oral exam 20 points).

**Partial exam 2**

The partial exam 2 includes modules 4, 5, 6, and 7. It is structured in two parts: the written and the oral exams. The written part is in the form of an MCQ test with 10 questions. Each question is scored +1 or -1 point based on the correct or incorrect answer to the question. The student can score the maximum of 10 points. A student who acquires 55% on the test takes an oral exam which consists of 4 questions. The maximum number of points on the oral exam is 20. Seminars are part of the test and the oral exam.

**Final exam**

The final exam consists of those parts the student did not pass during

	<p>the course. The final exam has the same structure as the partial exams.</p> <p>The written test – 20 questions:</p> <ul style="list-style-type: none"> <li>a) MCQ test 1 - 10 questions (modules 1, 2, and 3)</li> <li>b) MCQ test 1 - 10 questions (modules 4, 5, 6, and 7).</li> </ul> <p>A student who scores 55% on both tests takes the oral exam with 6 questions from the modules which were parts of the partial exams. The maximum number of points on the final exam is 60.</p> <p>A student who has passed certain parts of the course, on the final exam passes the remaining parts.</p> <p><b>The repeated and correction exams</b></p> <p>The repeated and correction exams are conducted according to the previously defined criteria of the final exam.</p> <p>Final score is obtained on the basis of the sum of points achieved during the course:</p> <ul style="list-style-type: none"> <li>1. Seminars – maximum 5 points.</li> <li>2. Colloquia – maximum 35 points.</li> <li>3. Partial exams – maximum 60 points.</li> </ul>
6. Literature	<p>Recommended</p> <ul style="list-style-type: none"> <li>1. Matko Marušić, Zdenko Kovač, Stjepan Gamulin. Pathophysiology. Zagreb: Medicinska naklada; 2013.</li> <li>2. Gary D Hammer, Mc Phee SJ. Pathophysiology of disease: An introduction to clinical medicine. 7th ed. New York: Lange Medical Books/Mc Graw Hill; 2014.</li> <li>3. Sheila Grossman, Carol Mattson Porth. Essentials of Pathophysiology. Concepts of Altered States. 9th ed. Philadelphia: Wolters Kluwer; 2014.</li> <li>4. Kubishkin A.V. General and clinical pathophysiology. Vinnytsia: Nova Knyha Publishers; 2011.</li> <li>5. McCane LK, Huether ES. Pathophysiology. The Biologic Basis for Disease in Adults and Children. 6th ed. St. Louis: Mosby; 2010.</li> <li>6. Almir Fajkić. A textbook of practical pathophysiology. Sarajevo: Medical faculty University of Sarajevo; 2018.</li> </ul>

7. Remarks	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: <a href="mailto:almir.fajkic@mf.unsa.ba">almir.fajkic@mf.unsa.ba</a>
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## COURSE PLAN: PATHOPHYSIOLOGY 2

Days	Form of Instructions and materials	Number of classes
<b>Day 1.</b>	<b>Lectures:</b> Alterations in the hematologic system – Red blood cell disorders	2
	<b>Seminar:</b> Incompatibility of AB0 system and Rh system	1
	<b>Laboratory practical work:</b> – Qualitative and quantitative disorders of red blood cells – Disorders in the development of red blood cells – Morphological changes of red blood cells: shape, size, color – Testing regenerative abilities of blood in anemia – Determination of reticulocytes count (Wolfer)	2
<b>Day 2.</b>	<b>Lectures:</b> Alterations in the hematologic system – White blood cell disorders – Platelet and coagulopathic disorders	2
	<b>Seminar:</b> Acute and chronic leukemia pathogenesis	1
	<b>Laboratory practical work:</b> Laboratory tests in the diagnosis of anemia (red blood cells count, Hemoglobin, Hematocrit, Iron, TIBC, UIBC)	2
<b>Day 3.</b>	<b>Lectures:</b> Alterations in the cardiovascular system  – Valvular heart disease – Congenital heart defects – Disorders of the pericardium – Coronary heart disease	2
	<b>Seminar:</b> Hemodynamic disorders in arrhythmias	1
	<b>Laboratory practical work:</b> Megaloblastic and sideropenic anemia - analysis of blood and bone marrow smear	2
<b>Day 4.</b>	<b>Lectures:</b> Alterations in the cardiovascular system  – Alterations in blood pressure: hypertension, hypotension – Insufficiency and decompensation of the heart	2
	<b>Seminar:</b> Malignant hypertension, pulmonary hypertension	1
	<b>Laboratory practical work:</b> Aplastic and hemolytic anemia - analysis of blood and bone marrow smear	2



<b>Day 5.</b>	<b>Lectures:</b> Alterations in the endocrine system <ul style="list-style-type: none"> <li>– General aspects of altered endocrine function</li> <li>– Hormone secretion disorders</li> <li>– Hormone receptor disorders</li> <li>– Disorders of the system hypothalamus-pituitary-target gland</li> <li>– Anterior pituitary disorders</li> <li>– Posterior pituitary disorders</li> <li>– Thyroid disorders</li> </ul>	2
	<b>Seminar:</b> Paraneoplastic syndrome	1
	<b>Laboratory practical work:</b> Determination of bleeding and clotting time <ul style="list-style-type: none"> <li>– Determination of bleeding time (Duke; Ivy)</li> <li>– Determination of clotting time (Lee–White; Burcker)</li> <li>– Prothrombin time test (Quick)</li> <li>– Determining the clotting time of recalcified plasma (Howel)</li> </ul>	2
<b>Day 6.</b>	<b>Lectures:</b> Alterations in the endocrine system <ul style="list-style-type: none"> <li>– Disorders of adrenal cortical function</li> <li>– Disorders of adrenal medulla function</li> <li>– Parathyroid hormone disorders</li> <li>– Alterations in the male reproductive system</li> <li>– Alterations in the female reproductive system</li> </ul>	2
	<b>Seminar:</b> Osteoporosis	1
	<b>Laboratory practical work:</b> Determination of bleeding and clotting time <ul style="list-style-type: none"> <li>– Rumpel-Leede capillary fragility test</li> <li>– Platelet count test (Fonio)</li> </ul>	2
<b>Day 7.</b>	<b>Lecture and Seminar- Partial exam 1</b>	2+1
	<b>Laboratory practical work:</b> <ul style="list-style-type: none"> <li>– White blood cells disorders tests</li> <li>– White blood cells morphological changes</li> <li>– Differential leukocyte count</li> </ul>	2
<b>Day 8.</b>	<b>Lectures:</b> Alterations in the respiratory system <ul style="list-style-type: none"> <li>– Disorders of ventilation: hypoventilation, hyperventilation</li> <li>– Obstructive airway disorders</li> <li>– Restrictive airway disorders</li> </ul>	2
	<b>Seminar:</b> <ul style="list-style-type: none"> <li>– Consequences of ventilation disorders</li> <li>– Ventilation/perfusion ratio disorders</li> </ul>	1
	<b>Laboratory practical work:</b>	2

	Acute leukemia - analysis of blood and bone marrow smear Chronic leukemia - analysis of blood and bone marrow smear	
<b>Day 9.</b>	<b>Lectures:</b> Alterations in the respiratory system <ul style="list-style-type: none"> <li>– Disorders of gas exchange</li> <li>– Pathogenesis of pulmonary edema</li> <li>– Pulmonary embolism</li> <li>– Pneumothorax</li> <li>– Atelectasis</li> <li>– Disorders of respiratory rhythm</li> </ul>	2
	<b>Seminar:</b> Disorders of non-respiratory functions of the lungs	1
	<b>Laboratory practical work: Colloquium 1</b>	2
<b>Day 10.</b>	<b>Lectures:</b> Alterations in the urinary system <ul style="list-style-type: none"> <li>– Prerenal disorders of kidney function</li> <li>– Disorders of glomerular function</li> <li>– Nephrotic syndrome</li> </ul>	2
	<b>Seminar:</b> Postrenal disorders of kidney function	1
	<b>Laboratory practical work:</b> Physical and chemical examination of urine	2
<b>Day 11.</b>	<b>Lectures:</b> Alterations in the urinary system <ul style="list-style-type: none"> <li>– Acute and chronic renal failure</li> <li>– Vascular kidney disorders</li> <li>– Tubulointerstitial disorders</li> </ul>	2
	<b>Seminar:</b> <ul style="list-style-type: none"> <li>– Oliguria</li> <li>– Poliuria</li> <li>– Disorders of urine composition</li> </ul>	1
	<b>Laboratory practical work:</b> Microscopic examination of urine sediment	2
<b>Day 12.</b>	<b>Lectures:</b> Alterations in the gastrointestinal system <ul style="list-style-type: none"> <li>– Disorders of pharynx and esophagus</li> <li>– Disorders of motor function of the stomach</li> <li>– Ulcer disease</li> <li>– Disorders of small and large intestines</li> <li>– Vomiting</li> <li>– Diarrhea</li> <li>– Ileus</li> <li>– Constipation</li> </ul>	2
	<b>Seminar:</b> Disorders of the exocrine pancreas	1



Code: <b>MFSE 0603</b>	<b>Course title: PHARMACOLOGY AND TOXICOLOGY 2</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>5</b>
Status: <b>obligatory</b>	Total contact hours: <b>75</b>		
Prerequisites: <b>According to the study regulation</b>			
Lecturers: Full Professor Svjetlana Loga- Zec MD PhD, Associate Professor Jasna Kusturica MD PhD, Associate Professor Maida Rakanović-Todić MD PhD, Assistant Professor Aida Kulo Ćesić, Assistant Professor Lejla Burnazović-Ristić MD PhD, Assistant Sanita Maleškić MD			
1. Overall aim	The overall aim of the Pharmacology and Toxicology 2 Course is to gain basic knowledge in special phamacology, to give overview of guidelines for treatment in highly prevalent diseases in general practice as well as the basics of monitoring and individualization of therapy.		
2. Course contents	The following topics will be covered within the Modules:  Module 1. Pharmacology of the nervous system  Module 2. Pharmacology of the cardiovascular system  Module 3. Pharmacology of the respiratory tract  Module 4. Pharmacology of the gastrointestinal tract  Module 5. Hormones		
3. Learning outcomes (Knowledge, skills and competences)	Student will learn the fundamental, of special pharmacology which is necessary for future practice as general practitioners. Through practical work the students will be able to gain sufficient knowledge in order to apply rules and algorithms of rational pharmacotherapy in everyday practice.  <i>Through the lectures and seminars the students will gain following knowledge and competences:</i>  1. Learn the basics of drug mechanisms in nervous system, distinguish between different drugs affecting CNS: hypnotic, sedatives and anxiolytics, antipsychotics, antidepressants and anticonvulsants as well as treatment of insomnia and anxiety. 2. Understand the mechanism of addiction. 3. Understand the basic of drug mechanisms in the cardiovascular system, distinguish between different drugs used in the cardiovascular diseases: cardiac glycosides, antiarrhythmics, drugs for the treatment myocardial ischemia, antihypertensives, antihypotensives and drugs for the treatment of shock, as well as drugs that affect adrenergic receptors and noradrenergic transmission. 4. Learn the drugs used in the treatment of respiratory disorders. 5. Understand the drug mechanisms in the gastrointestinal tract and learn the treatment of gastrointestinal diseases.		

	<p>6. Understand the drugs used in the treatment of endocrinology diseases.</p> <p>7. Discover the bronchial asthma, hypertension and diabetes treatment guidelines.</p> <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>- Rational prescription of a drug according to the characteristics of an individual patient by applying a pharmacotherapy algorithm</li> <li>- Rational prescription of drugs in the treatment of hypertension, <i>H pylori</i> infection, insomnia and anxiety</li> <li>- Proper prescription of drugs (drug prescription)</li> <li>- Adequate dosing of drugs in order to prevent unsafe and ineffective treatment (using information from the Drug Register and the Pharmacotherapy Handbook)</li> </ul>
4. Teaching methods	<ul style="list-style-type: none"> <li>- Lectures: 32 hours</li> <li>- Seminars: 13 hours</li> <li>- Laboratory practical work: 30 hours</li> </ul>
5. Method of knowledge assessment and examination	<p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical laboratory Colloquium.</p> <p>Continuous assessment of knowledge consists of:</p> <ul style="list-style-type: none"> <li>- Colloquium 1 and 2</li> <li>- Partial Exam 1 and 2</li> </ul> <p>The mandatory requirement for a partial examination is a colloquy.</p> <p><b>Partial exams:</b>  Partial exam 1 includes topics covered in Module 1 and 2.  Partial exam 2 includes topics covered in Modules 3-5.  Partial exam will be in the form of written test with 15 Multiple choice questions (MCQ) and 5 Extended response questions (ERQ).</p> <p>Each correct answer to the MCQ question score 1 point, and the correct and complete answer to the ERQ score 3 points. The minimum of acquired points is 16 points (55%, rating 6) and maximum is 30 points.</p> <p><b>Colloquium 1 and 2:</b>  Within the Colloquium 1, the student can acquire a minimum of 11 and a maximum of 20 points.  Within the Colloquium 2, the student can acquire a minimum of 11 and a maximum of 20 points.</p> <p><b>Final exam:</b>  For students who did not pass any of the parts of a continuous knowledge and skills assessment.</p> <p>The final grade is formed by summing up all the points earned for each form of knowledge checking (minimum 55, maximum 100 points), with</p>

	<p>respect to the following rules and regulations:</p> <ul style="list-style-type: none"> <li>○ 95-100% correct answers - grade 10</li> <li>○ 85-94% correct answers - grade 9</li> <li>○ 75-84% correct answers - grade 8</li> <li>○ 65-74% correct answers - grade 7</li> <li>○ 55-64% correct answers - grade 6</li> <li>○ rest of the students – failing grade - grade 5</li> </ul>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> <li>– Rang HP, Dale MM, Ritter JM, Flower JR, Henderson G. Pharmacology. USA. 7th edition. Elsevier Inc; 2012.</li> <li>– Katzung's -Basic and Clinical Pharmacology. 12th edition. USA. The McGraw Hill Companies Inc; 2012.</li> <li>– Brunton L, Chabner B, Knollman B. Goodman &amp; Gilman's the pharmacological basis of therapeutics. USA 12th edition. The McGraw Hill Companies Inc; 2011.</li> </ul>
7. Remarks	<p>Consultations will be possible every day from 12 to 13 h., with prior announcement to the secretary of the Department or by e-mail: <a href="mailto:farmakologija@mf.unsa.ba">farmakologija@mf.unsa.ba</a></p> <p>In case of absences from teaching, the procedure defined by actual legal regulations will be followed.</p>

## COURSE PLAN: PHARMACOLOGY AND TOXICOLOGY 2

Week	Form of teaching	Number of hours
Week 1.	<b>Lecture:</b> Hypnotics, sedatives, and anxiolytics. <b>Seminar:</b> A Case Study, benzodiazepines. <b>Practical work:</b> Choosing P-drugs for insomnia and anxiety.	2     1 2
Week 2.	<b>Lecture:</b> Antipsychotics and antidepressants. <b>Seminar:</b> Pharmacology of the nervous system, P-drugs. <b>Practical work:</b> Simulated patients - insomnia and anxiety.	2   1 2
Week 3.	<b>Lecture:</b> Anticonvulsants. <b>Seminar:</b> Case Study: Therapy of Parkinson's disease. <b>Practical work:</b> P drugs for convulsions and seizures.	2   1 2
Week 4.	<b>Lecture:</b> Antihypertensives, antihypotensives and treatment of shock. <b>Seminar:</b> Pharmacology of the cardiovascular system, adrenergic and noradrenergic transmission. <b>Practical work:</b> P-drugs for hypertension.	2     1 2
Week 5.	<b>Lecture:</b> Drugs for the treatment of myocardial ischemia. <b>Seminar:</b> Pharmacology of the cardiovascular system, P-drugs for hypertension and myocardial ischemia. <b>Practical work:</b> P- drugs for angina pectoris and myocardial infarction. Simulated patients. Use of fibrinolytics in acute myocardial infarction and ischemic stroke.	2    1  2
Week 6.	<b>Lecture:</b>	2

	<p>Antiarrhythmics.</p> <p><b>Seminar:</b> Pharmacology of the cardiovascular system, P-drugs for hypertension and myocardial ischemia.</p> <p><b>Practical work:</b> P- drugs for the treatment of arrhythmias. Simulated patients.</p>	<p>1</p> <p>2</p>
Week 7.	<p><b>Lecture:</b></p> <p>The drugs in the treatment of heart failure.</p> <p><b>Seminar:</b> Pharmacology of the cardiovascular system, P- drugs for the treatment of heart failure and arrhythmias.</p> <p><b>COLLOQUIUM 1</b></p>	<p>2</p> <p>2</p> <p>2</p>
Week 8.	<p><b>Lecture:</b></p> <p>Pharmacology of the respiratory system.</p> <p><b>Seminar:</b></p> <p>Pharmacology of the respiratory system, case studies.</p> <p><b>Practical work:</b> Choosing P- drugs for asthma.</p>	<p>2</p> <p>1</p> <p>2</p>
Week 9.	<p><b>PARTIAL EXAM 1</b></p> <p><b>Practical work:</b> Simulated patients – asthma.</p>	<p>3</p> <p>2</p>
Week 10.	<p><b>Lecture:</b></p> <p>Pharmacology of the gastrointestinal system.</p> <p><b>Seminar:</b></p> <p>Pharmacology of the gastrointestinal system, P-drugs.</p> <p><b>Practical work:</b> P- drugs for peptic ulcer, Triple Therapy.</p>	<p>2</p> <p>1</p> <p>2</p>
Week 11.	<p><b>Lecture:</b></p> <p>The hormones of the endocrine pancreas, antidiabetics.</p> <p><b>Seminar:</b></p> <p>Pharmacology of the endocrine system, P-drugs.</p> <p><b>Practical work:</b> The treatment of diabetes mellitus.</p>	<p>2</p> <p>1</p> <p>2</p>
Week 12.	<p><b>Lecture:</b></p> <p>Reproductive System.</p> <p><b>Seminar:</b></p> <p>Pharmacology of reproductive system, P drugs.</p>	<p>2</p> <p>1</p>



	<b>Practical work:</b> Simulated patients - diabetes mellitus.	2
Week 13.	<b>Lecture:</b> Pituitary and adrenal cortex.  <b>Seminar:</b> Pharmacology of endocrine system, P drugs.  <b>Practical work:</b> Simulated patients.	2   1   2
Week 14.	<b>Lecture:</b> Thyroid hormones, bone metabolism.  <b>Seminar:</b> Pharmacology of endocrine system, P drugs.  <b>COLLOQUIUM 2</b>	2   2   2
Week 15.	<b>PARTIAL EXAM 2</b>	3
<b>Week 17.-18.</b>	<b>FINAL EXAM - REGULAR EXAMINATION TERM</b>	
<b>Week 19.-20.</b>	<b>FINAL EXAM – MAKE-UP EXAMINATION TERM</b>	
<b>SEPTEMBER</b>	<b>FINAL EXAM – SEPTEMBER EXAMINATION TERM</b>	

Code: <b>MFSE 0604</b>	Course title: <b>Medical Microbiology 2</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>4</b>
Status: <b>obligatory</b>	Total contact hours: <b>60</b>		
Prerequisites:	<b>According to the study regulations.</b>		
Lecturers: <b>Associate Professor Mufida Aljičević MD PhD, Associate Professor Sabina Mahmutović Vranić MD PhD, Assistant Professor Velma Rebić MD PhD, Assistant Amila Abduzaimović MD</b>			
1. Overall aim	The overall aim of the Medical Microbiology 2 Course is to increase the students`understanding of specific etiological factors of human infectious diseases caused by viruses, parasites and fungi, their morphology, identification, disease pathogenesis, basic clinical features, biological samples and therapy basic.		
2. Course contents	The following topics will be covered within the Modules: Module 1: General medical virology Module 2: Special medical virology Module 3: General and special medical parasitology Module 4: General and special medical mycology		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will gain the knowledge about determining the morphology, structure and role of specific microorganisms as viruses, parasites and fungi, their potentials to cause infectious diseases, and they will be able to understand importance of applying adequate anti-infective therapy in a timely manner.</p> <p>Through practical work the students will gain knowledge to prepare, visualize, and analyze different species of microorganisms by using several methods of laboratory work.</p> <p><i>Through lectures the students will gain following knowledge and competences:</i></p> <ol style="list-style-type: none"><li>1. Discover importance of knowing the general structure and morphology of viruses.</li><li>2. Learn types, forms and roles of RNA and DNA viruse sin causing the diseases.</li><li>3. Understand importance of knowing the general structure and morphology of parasites, and specified types, forms and their roles in causing diseases.</li><li>4. Understand importance of knowing the general structure and morphology of fungy, and specified types, forms and their roles in causing diseases.</li></ol> <p><i>Through the practical laboratory work students will acquire folloving skills:</i></p> <ul style="list-style-type: none"><li>- Identification of diagnostic techniques in examination of various biological samples</li></ul>		

	<ul style="list-style-type: none"> <li>- Isolation and identification of viruses using fertilized chicken eggs and cell culture</li> <li>- Application of native and stained microscope specimens in identification of parasites</li> <li>- Microscopic examination and culture of fungal specimens</li> </ul>
4. Teaching methods	<p>Lectures: 30 hours</p> <p>Laboratory practical work: 30 hours</p>
5. Method of knowledge assessment and examination	<p>Written test in the form of – Multiple Choice Questions (MCQ) test and Extended Response Questions (ERQ)</p> <p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical Laboratory Colloquium.</p>
6. Literature	<p>Recomended:</p> <ol style="list-style-type: none"> <li>1. Carroll K. <i>at all</i>. Jawetz, Melnick &amp; Adelberg`s Medical Microbiology. 27<sup>th</sup> Edition: McGraww-Hill Education; New York 2016.</li> </ol>
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: mikrobiologija@mf.unsa.ba</p>

## COURSE PLAN: MEDICAL MICROBIOLOGY 2

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<b>Lecture:</b> General Properties of Viruses. Pathogenesis and Control of Viral Diseases.	2
	<b>Practice:</b> Diagnostics of viral infections.	2
Week 2.	<b>Lecture:</b> RNA viruses. Picornaviridae and Caliciviridae.	2
	<b>Practice:</b> Isolations and standardization of viruses. Serological diagnostic in virology.	2
Week 3.	<b>Lecture:</b> Reoviridae, Togaviridae and Flaviviridae.	2
	<b>Practice:</b> Diagnostic value of rapid tests.	2
Week 4.	<b>Lecture:</b> Orthomyxoviridae and Paramyxoviridae.	2
	<b>Practice:</b> Chicken Embryo Inoculation.	2
Week 5.	<b>Lecture:</b> Arenaviridae, Rhabdoviridae, Coronaviridae and Filoviridae.	2
	<b>Practice:</b> Immunoenzyme tests.	
Week 6.	<b>Lecture:</b> Retroviridae and Bunyaviridae.	2
	<b>Practice:</b> ELISA and Western blot tests in HIV infection diagnostics.	1
	<b>Colloquium I</b>	1
Week 7.	<b>Lecture:</b> DNA viruses. Parvoviridae, Polyomaviridae, Papillomaviridae, Adenoviridae and Poxviridae.	2
	<b>Practice:</b> Polymerase chain reaction (PCR)	2
Week 8.	<b>Lecture:</b> Hepadnaviridae, Herpesviridae.	1
	<b>Partial exam I</b>	1
	<b>Practice:</b> Laboratory diagnostic of hepatitis viral infections.	2
Week 9.	<b>Lecture:</b> Medical Parasitology. Classification of Parasites. Intestinal Protozoan Infections. Blood and Tissue Protozoan Infections.	2

	<b>Practice:</b> Laboratory diagnostics of parasitic diseases	2
Week 10.	<b>Lecture:</b> Nematodes  <b>Practice:</b> Laboratory diagnostics of Nematodes.	2
Week 11.	<b>Lecture:</b> Cestodes, Trematodes  <b>Practice:</b> Laboratory diagnostics of Cestodes and Trematodes.  <b>Colloquium II</b>	2  1  1
Week 12.	<b>Lecture:</b> Arthropods  <b>Practice:</b> Identification of Arthropods.	2  2
Week 13.	<b>Lecture:</b> General Properties and Classification of Pathogenic Fungi.  <b>Practice:</b> Laboratory diagnostics of fungal diseases.	2  2
Week 14.	<b>Lecture:</b> Dermatophytes, Yeasts and Mycotoxins.  <b>Practice:</b> Laboratory diagnostics of fungal diseases.	2  2
Week 15.	<b>Lecture:</b> Dimorphic fungi  <b>Partial exam II</b>  <b>Colloquium III</b>	1  1  2
Weeks. 17/18	<b>Final exam (regular term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination exam)</b>	

Code: <b>MFSE 0605</b>	Course title: <b>CLINICAL PROPEDEUTICS</b>		
Level: <b>clinical</b>	Study: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>4</b>
Status: <b>obligatory</b>			Total contact hours: <b>65</b>
Prerequisites:	<b>According to the study regulations</b>		
Lecturers: <b>Professor Bakir Mehić, MD, PhD; Professor Senija Rašić MD PhD; Professor Mirza Dilić MD PhD; Professor Šekib Sokolović MD PhD; Professor Halima Resić MD PhD; Professor Alma Sofo-Hafizović MD PhD; Professor Belma Paralija MD PhD; Assistant Professor Azra Husić-Selimović MD PhD; Assistant Professor Damir Rebić MD PhD, Assistant Professor Amela Dizdarević-Bostandžić MD PhD, Assistant Professor Ismana Šurković MD PhD; Assistant Professor Akif Mlačo MD PhD; Assistant Professor Alen Džubur MD PhD; Senior ass. Nadža Zubčević MD PhD; Senior ass. Medžida Rustempašić MD PhD; Azra Durak-Nalbantić MD PhD; Lejla Ibričević-Balić MD PhD; Džanela Prohić MD PhD; Vanja Karlović MD MSc; Alden Begić MD MSc; Amela Bećiragić MD PhD.</b>			
1. Overall aim	The objective of the subject is to acquire knowledge and skills needed for examination of the patient and get acquainted with leading symptoms, signs and syndromes in the field of internal medicine.		
2. Course contents	<p>The following topics will be covered within the Modules:</p> <p><b>Module 1. Basic skills in propedeutics</b> Through the Module the student will get acquainted with symptoms and signs of illnesses, access to the patient, general anamnesis, general and specific symptomatology.</p> <p><b>Module 2. Head and neck examination. Symptoms of respiratory disorders.</b> Through the Module students will be introduced to the methodology of physical examination of the head and neck, and general and specific symptoms of respiratory tract disorders.</p> <p><b>Module 3. Chest and lung examination</b> Through the Module students will be introduced to the physical examination of the chest, topography of the chest, inspection and palpitations of the chest, fremitus pectoralis, breast examination, percussion and auscultation of the chest (normal breathing noise, pathological types of breathing) and accompanying sound phenomena.</p> <p><b>Module 4. Heart examination</b> Through the Module students will be introduced to the predominant symptoms in heart diseases, physical examination of the heart: inspection of precordia, palpation of ixtus and pulse, auscultation of the heart sounds, heart rate and heart murmurs. Through this Module, the student will be familiar with the recording and analysis of electrocardiogram (ECG).</p> <p><b>Module 5. Abdomen examination</b> Through the Module students will be introduced to the anamnesis of gastrointestinal diseases, the most common symptoms and signs of gastrointestinal diseases, physical abdominal examination: topography of the abdominal region, inspection, superficial and deep palpation.</p>		

	<p>physiological and pathological findings, percussion and auscultation of the abdominal region, digitorectal examination, as well as with basic diagnostic methods in gastroenterohepatology.</p> <p><b>Module 6. Urinary tract examination</b> Through the Module students will be introduced to the symptomatology of urinary tract diseases, physical examination of the kidney and urinary system (inspection, palpation, succussion), and basic diagnostic methods in nephrology.</p> <p><b>Module 7. Musculoskeletal system examination</b> Through the Module students will be introduced to the symptomatology and signs of the locomotor system diseases, physical examination of extremities and musculoskeletal system and main diagnostic procedures in patients with disorders of locomotor and musculoskeletal system.</p> <p><b>Module 8. Endocrine system examination</b> Through the Module students will be introduced to the symptomatology and signs of endocrine system disorders, secondary sexual characteristics, genital examination and main diagnostic procedures in patients with endocrinological diseases.</p> <p><b>Module 9. Specifics in examination of patients with hematologic diseases</b> Through the Module students will be introduced to the symptomatology, physical examination and specificity of the hematological patients and main diagnostic procedures in haematological patients (peripheral smear, sternal puncture, bone biopsy, lymph node biopsies).</p> <p><b>Module 11. Overview of the arteries and veins of the lower extremities</b> Through the Module students will be introduced to the examination the arteries and veins of the lower extremities: symptomatology and signs acute and chronic venous insufficiency, and acute and chronic arterial insufficiency, vascular noises in the abdomen and basic diagnostic methods in angiology.</p>
3. Learning outcomes (knowledge, skills and competences)	<p>Students will acquire the necessary knowledge for adequate patient examination. They will learn to recognize normal findings and different signs of disturbance in morphology and function of organs and organ systems ie to set a working diagnosis.</p> <p>Correctly taken history of disease and data obtained by physical examination affect the patient's further diagnostic processing, where physician decisions may have an impact on the course and prognosis of the disease.</p> <p>Through the course of the subject "Clinical Propedeutics" students will develop the following skills:</p>

*Skills that a student needs to **know practically to perform** (knows how and does) - specific competencies:*

1. Properly take the history of the disease
2. Inspection, palpation, percussion of the head
3. Inspection and palpation of the lymph nodes and the auscultation of the blood vessels of the neck
4. Inspection, palpation and auscultation of the thyroid gland
5. Inspection, palpation, percussion and auscultation of the chest and lung
6. Interpretation of physiological and pathological pulmonary syndrome
7. Breast examination
8. Inspection and percussion of the heart boundaries
9. Auscultation of the heart valves (tones and murmurs)
10. Method of making electrocardiography
11. Interpretation of electrocardiograms
12. Inspection, palpation, percussion and auscultation of the abdominal region
13. Digito-rectal examination
14. Interpretation of rtg findings of gastroduodenum, bowel passage and irigography
15. Kidney palpation
16. Auscultation of renal arteries
17. Interpretation of urinary findings
18. Interpretation of renal function evaluation tests
19. Interpretation of native urinary tract and intravenous urography
20. Interpretation of laboratory tests in evaluating the function of the endocrine system
21. Interpretation of hematological laboratory findings
22. Physical examination of a hematological patient
23. Physical examination of joints and extremities
24. Inspection, palpation and auscultation of the peripheral arterial system
25. Inspection and palpation of the peripheral vein system

*Skills that a student **needs to know** (know how and when) - general competencies :*

1. Diagnostic methods in pulmology
  - spirometry
  - plethysmography
  - gas analysis of arterial blood
  - pharmacodynamic tests
  - V/P spect - lung scintigraphy
  - CT and MRI of the lung
  - endoscopic methods (bronchoscopy)
  - bronchography
  - thoracocentesis
  - transthoracic pleura and lung biopsy



	<ul style="list-style-type: none"> <li>–allergologic skin tests</li> <li>–types of bronchoalveolar wash analysis</li> </ul>
	<p>2. Diagnostic methods in cardiology</p> <ul style="list-style-type: none"> <li>– echocardiography</li> <li>– phonocardiography</li> <li>– ergometry</li> <li>– coronary angiography</li> <li>– pericardial puncture</li> </ul>
	<p>3. Diagnostic methods in gastroenterohepatology</p> <ul style="list-style-type: none"> <li>- gastroscopy</li> <li>- colonoscopy</li> <li>- liver, gall bladder and pancreas ultrasound</li> <li>- liver biopsy</li> <li>- endoscopic retrograde holecistopancreatography</li> <li>- abdominal puncture</li> </ul>
	<p>4. Diagnostic methods in nephrology</p> <ul style="list-style-type: none"> <li>– kidney and urinary bladder ultrasound</li> <li>– kidney scintigraphy (dynamic and static)</li> <li>– doppler of the blood vessels of the kidney</li> <li>– CT and MRI of the kidneys</li> <li>– retrograde pielography</li> <li>– micturition cystogram</li> <li>– percutaneous nephrostomy</li> <li>– renal biopsy</li> </ul>
	<p>5. Diagnostic methods in angiology</p> <ul style="list-style-type: none"> <li>– Continuous Doppler (CWD) blood vessels</li> <li>– measure the brachy-pedal index</li> <li>– Color and Power Doppler blood vessels</li> <li>– angiography of blood vessels</li> </ul>
	<p>6. Diagnostic methods in endocrinology</p> <ul style="list-style-type: none"> <li>- scintigraphy of the thyroid gland</li> <li>- ultrasonography of the thyroid and parathyroid glands</li> <li>- CT and MRI glands with endocrine secretion</li> <li>- OGTT test</li> </ul>
	<p>7. Diagnostic methods in hematology</p> <ul style="list-style-type: none"> <li>– sternal puncture and making of sternal puncture smear</li> <li>– bone biopsy</li> <li>– lymph node puncture</li> <li>– cytological and immunofenotypic blood analysis</li> </ul>

4. Teaching methods	<p>Teaching takes place through:</p> <ul style="list-style-type: none"> <li>- Lectures: 26 hours</li> <li>- Practical Exercises: 39 hours</li> </ul>
5. Methods for evaluating knowledge and passing exams	<p>Assessment of the acquired knowledge and skills will be carried out continuously through two blocks, each of which has a practical and theoretical (partial) exam. Assessment of the knowledge of the first block includes Modules 1 - 6 and the second block Modules 7 - 13.</p> <p><b>Practical exams</b></p> <p>Practical parts of exams include the evaluation of the acquired skills from the fields involved in the mentioned blocs of teaching. Evaluation of the acquired skills is done through the fulfillment of tasks previously defined in the checklist. Within the practical exam, the student can win a maximum of 20 points from the first and 20 points from the second practical exam, ie 40 points from both practical exams. A student must earn at least 11 points from each practical exam to qualify as a passed.</p> <p><b>Partial exams</b></p> <p>Partial exam 1 is a written test with 30 MCQ (multi choice questions). We will examine the knowledge gained through the Modules 1 - 6. Each correct answer carries one point, a total of 30 points. The test is considered passed if you have won at least 17 points. If a student has not passed Partial exam 1, it take pass again on a final exam.</p> <p>Partial exam 2 is a written test with 30 MCQ. We will examine the knowledge gained through the Modules 7 - 13. Each correct answer carries one point, a total of 30 points. The test is considered passed if you have won at least 11 points. If a student has not passed Partial exam 1, it take pass again on a Final exam.</p> <p><b>Final exam</b></p> <p>On Final exam the student takes the parts that did not pass or did not go to the exam during the semester. The condition for taking the written part of the Final exam is previously passed practical part of the exam. If the student for the anticipated activities and assessment of the knowledge during the semester wins the number of points that meets the criteria for the pass grade, he / she is not obliged to go to the final exam.</p> <p><b>Repeated and Remedial exam</b></p> <p>Repeated and Remedial exam are conducted for the students that did not pass the exam parts or the Final exam. The condition for taking the written part of the Repeated and Remedial exam is previously passed practical part of the exam.</p> <p>The final grade is formed by summing all the points earned for each form of knowledge checking.</p>

	<i>Rating</i>	<i>Number of points</i>	<i>Description Rating</i>
	10 (A)	95-100	remarkable success without mistakes or with minor errors
	9 (B)	85-94	above average, with some mistakes
	8 (C)	75-84	average, with subtle 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:	<p><b>Recommended:</b></p> <ul style="list-style-type: none"> <li>– Bates. Guide for Physical Examination and History Taking (10th ed). USA: Lippincott; 2014.</li> </ul> <p><b>Additional:</b></p> <ul style="list-style-type: none"> <li>– Nicki R, Brian R, Walker B, Stuart H. Davidson's Principle and Practice of Medicine. 21st edition. USA: Churcill Livingstone; 2010.</li> <li>– Antić R. Interna propedevtika, fizička dijagnostika (5 ed). Beograd – Zagreb: Medicinska knjiga; 1989.</li> </ul>		
7. Remarks	<p>Lectures and practices are performed according to implementation plan at the teaching bases of the Cathedra for Internal Medicine and Clinical Propedeutics. Valid sanitary booklet and proper clothing are mandatory for student's attendance. All parts of course program are obligatory. The absence from practicals could be excused only with appropriate and verified certification (maximal up to 20% missing practice). Consultation period for students: each working day with prior announcement to the teaching personnel.</p> <p>Professor in charge: <a href="mailto:bakir.mehic@mf.unsa.ba">bakir.mehic@mf.unsa.ba</a></p>		

## COURSE PLAN: CLINICAL PROPEDEUTICS

Week	Form of teaching and work programme	Number of hours
Week 1.	<b>Lecture:</b> Definition of clinical propedeutics. Health and illness. Medical history (current disease, early diseases, personal history, family and social history, epidemiological surveys, decursus morbi and epicrisis). Basic methods of physical examination of an internist patient. General status of the patient (status praesens).	2
	<b>Practice:</b> Learning the basic principles of taking history and professional communication with the patient. Creating a list of specific symptoms due to which the patient was admitted to the hospital, and the list of special symptoms per organ systems. General physical examination of patient who belongs to the field of internal medicine. Inspection, palpation and percussion of the head. Palpation of the places of exit cranial nerves. Examination of face mimic, mobility of eyeballs, the reactions of pupils to light and accommodation, examination of nose corridors, mouth cavities, the outer ear canal. Examination of the neck: the shape and the mobility of the neck, the palpation of the lymph glands of the neck, palpation of the thyroid gland, inspection of the neck veins, auscultation of the carotids.	3
Week 2.	<b>Lecture:</b> Physical examination of the head and neck. General and specific symptomatology of respiratory tract disease.	2
	<b>Practice:</b> Taking history of the disease, making a list of common symptoms, and list of major presenting symptoms in a patient with respiratory illnesses. Record and comment on breathing frequency, appearance of skin and visible mucous membranes. Performing the examination of the chest and determining the type of chest. Palpation of the front and back wall of the chest in inspiration and expiration, evaluation of the spread of the chest. Percussion of the chest, determining the lower boundaries of the lung, mobility of lung bases and widening of lung peaks. Auscultation of inspiratory and expiratory respiratory noises.	3
Week 3.	<b>Lecture:</b> Physical examination of the chest and lungs (inspection, palpation, percussion and lung auscultation). Interpretation of physiological and pathological pulmonary syndrome.	2
	<b>Exercises:</b> Applying the examination of the respiratory system to hospital patients. Overview of the respiratory system in relation to symptoms and condition (spirometry, pletismography, arterial blood gases, pharmacodynamic tests, perfusion-ventilation scintigraphy of the lungs, CT and MRI lungs, bronchoscopy, bronchography, pleural puncture,	3

	transthoracic biopsy of pleura and lungs, allergic skin testing, laboratory treatment of broncho-alveolar lavage).	
Week 4.	<p><b>Lecture:</b> Diagnostic methods in pulmonology.</p> <p><b>Practice:</b> Examination of the respiratory system in relation to the symptoms and condition (spirometry, plethysmography, determination of arterial blood gases, pharmaco-dynamic tests, lung perfusion-ventilation scans, CT and MRI of the lungs, bronchoscopy, bronchography, thoracocentesis, transthoracic pleura and lung biopsy, allergenic skin testing, laboratory processing of bronchoalveolar lavage).</p>	<p>2</p> <p>3</p>
Week 5.	<p><b>Lecture:</b> Symptoms of heart disease. Inspection, palpation and percussion of precordial area. The basics of the heart auscultation.</p> <p><b>Practice:</b> Taking history of disease and learning the specificity of symptomatology of heart disease. Establishing a list of common and specific symptoms in a patient with heart diseases. Inspection of the neck vein and jugular venous pulsations. Locating the tip of the heart. Locating of the spots of heart estuaries on the chest. Auscultation of heart sounds and murmurs. Measurement of systolic and diastolic blood pressure. Palpation and determination of speed and rhythm of peripheral pulses, commenting on the range of normal values.</p>	<p>2</p> <p>3</p>
Week 6.	<p><b>Lecture:</b> Specificity of the history of the disease and the status of the major types of cardiac patients. Diagnostic methods in cardiology.</p> <p><b>Practice:</b> Diagnosis and identification of relevant symptoms (chest pain, difficulty breathing, palpitations, edema) in leading heart disease (angina pectoris, myocardial infarction, heart failure, hypertension ...). Diagnostic methods in cardiology. Precise setting of ECG electrodes (ECG conductors), ECG recording and rhythm, axis, speed, main complex analysis. Diagnostic laboratory tests in cardiology (blood vessels, heart enzymes, troponins). Phonocardiography, ergometry, coronarography, pericardial puncture.</p>	<p>2</p> <p>3</p>
Week 7.	<p><b>Lecture:</b> Specifics of the history of disease in patients with diseases of the abdominal organs. The most common symptoms and signs of abdominal illness. Physical examination of the region of abdomen (inspection, palpation, percussion and auscultation of abdomen). Diagnostic methods in digestive system organs testing. Interpretation of native scan of abdomen, contrast recording of gastroduodenum, bowel passage and irigography.</p>	<p>2</p> <p>3</p>

	<b>Practice: Practical exam 1</b>	
Week 8.	<b>Lecture: Partial exam 1</b>  <b>Practice:</b> Targeted history of illness in patients with symptoms of abdominal organs. Establishing lists of common and specific symptoms of abdominal organs. Inspection, palpation, percussion and auscultation of the abdomen. Palpation of the liver and spleen. The main diagnostic procedures for examination of digestive tract (gastroscopy, colonoscopy, ultrasound liver, gall bladder and pancreas, endoscopic retrograde cholecystopancreatography, puncture of ascites, biopsies).	2  3
Week 9.	<b>Lecture:</b> Symptoms and signs of diseases of the urinary system. Palpation and percussion of kidney. Functional and laboratory tests of the urinary system. Other diagnostic methods in kidney patients (ultrasound of the kidneys and bladder, renal scintigraphy (dynamic and static). Doppler blood vessels of the kidney, CT and MRI of kidneys, retrograde pyelography, micturition cystogram, kidney biopsy.  <b>Practice:</b> Establishing a list of symptoms in patients with urinary tract disorders. Physical methods of kidney examination (inspection, palpation, lumbar loggies succussion). Main diagnostic procedures in renal patients. Student training for interpretation of urine tests and assessment of kidney function.	2  3
Week 10.	<b>Lecture:</b> Symptomatology, physical examination and specificity in haematological patients. Symptoms and signs of anemic syndrome. The symptoms and signs of disease of white blood cells.  <b>Practice:</b> Making list of symptoms in hematologic patients. Specificity of physical finding in patients with haematological diseases. Main diagnostic procedures in haematological patients (peripheral smear, sternal puncture, bone biopsy, lymph node biopsies). Student training for the interpretation of blood picture findings.	2  3
Week 11.	<b>Lecture:</b> Symptomatology of the disease of the endocrine system (the anterior pituitary gland, thyroid gland, parathyroid glands, adrenal glands, gonads). Physical changes on external pole organs. External sexual secondary characteristics.  <b>Practice:</b> The history in patients with endocrine disorders. Physical examination of patients with endocrinological problems. The main diagnostic procedures in patients with endocrine disorders: thyroid scintigraphy, ultrasound of the thyroid and parathyroid glands, CT and MRI of glands with endocrine secretion, the OGTT test. Training of students to interpret biochemical findings in diabetic patients and using a blood glucose meter.	2  3

Week 12.	<b>Lecture:</b> Symptoms and signs of diseases of the human locomotor system and physical status. Symptomatology and signs of peripheral artery and vein diseases, physical status and diagnostic methods in angiology.	2
	<b>Practice:</b> Taking an anamnesis and recognizing the symptoms of the human locomotion system. Physical examination of joints and extremities. Symptoms and signs of peripheral artery and vein diseases. Inspection, palpation and auscultation of the peripheral arterial system. Inspection and palpation of the peripheral vein system. Auscultation of large abdominal arteries. Continuous Doppler (CWD) blood vessels, measuring brachio pedal index, Power Doppler blood vessels, angiography of blood vessels. The main diagnostic procedures in patients with disorders of the musculoskeletal and peripheral vascular system.	3
Week 13.		
Week 14.	<b>Practical exam 2</b>	3
Week 15.	<b>Partial exam 2</b>	2
<b>Week 17-18.</b>	<b>Final exam (regular examination term)</b>	
<b>Week 19-20.</b>	<b>Final exam (make-up examination term)</b>	
<b>September</b>	<b>Final exam (September examination term)</b>	

Code: <b>MFSE0606</b>	Course title: <b>Physics of Medical Diagnostic</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>1</b>
Status: <b>obligatory</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the study Regulation</b>		
Lecturers: Associate Professor Mustafa Busuladžić PhD, Assistant Zijad Muharemović MSc			
1. Overall aim	The overall aim of the Physics of Medical Diagnostics Course is to provide students with a general knowledge of the physical aspects of different medical imaging techniques used for diagnostic purposes.		
2. Course contents	The following topics will be covered during the Modules:  Module 1: <i>Basic physics of ultrasound imaging</i> Module 2: <i>Basic physics of X-ray imaging</i> Module 3: <i>Gamma ray and nuclear medical imaging</i> Module 4: <i>Basic magnetic resonance imaging physics</i>		
3. Learning outcomes (Knowledge, skills and competences)	<i>Students will acquire knowledge for understanding physical principles on which medical imaging techniques are based on, nuclear decay processes and corresponding radiation. Students will be able to understand the basic physics concepts related to ultrasound imaging, X-ray imaging, magnetic resonance imaging, key imaging parameters such as acoustic impedance, density, and the longitudinal relaxation times of human tissues.</i>  <i>Through practical work students will practice with computer simulation software.</i>  <i>Through the lectures and seminars the students will gain following knowledge and competences:</i>  <div><div>1.</div><div>Develop a basic understanding of ultrasound nature, reflection and scattering of the ultrasound and relate these to acoustic impedance. Demonstrate a detailed knowledge of the concept of attenuation, identify techniques that improve axial and lateral resolution. Learn about Doppler effect and its application.</div></div> <div><div>2.</div><div>Understand X-ray tubes, the generation of X-rays, and X-ray spectrum. Explain X-ray photon(s)-tissue interactions. Discover X-ray image properties, contrast, resolution, X-ray computed tomography (CT), and Hounsfield Units.</div></div> <div><div>3.</div><div>Understand the nature and origin of the three main types of radiation, and the decay processes which produce them.</div></div> <div><div>4.</div><div>Understand the physical processes involved in nuclear magnetic resonance. Develop a basic understanding of spin-lattice and spin-spin processes leading to the decay of a magnetic resonance imaging signal.</div></div>		



	<p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>-Working with real devices and equipment</li> <li>- Production of ultrasound</li> <li>- Measuring bioimpedance</li> <li>- Applications of biosensors</li> <li>- Defining attenuation coefficient of ionizing radiation</li> <li>- Usage of diadynamic currents in physical therapy</li> </ul>
4. Teaching methods	<p>Lectures: 12 hours</p> <p>Practical work: 8 hours</p>
5. Method of knowledge assessment and examination	<ul style="list-style-type: none"> <li>-Written tests in the form of Multiple choice questions (MCQ) tests</li> <li>Extended response questions (ERQ) tests</li> <li>-Oral examination</li> </ul> <p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical laboratory Colloquium.</p>
6. Literature	<p>Recommended:</p> <ol style="list-style-type: none"> <li>1. Kane S A. Introduction to Physics in Modern Medicine. 2 nd edition, New York: CRC Press; 2009.</li> <li>2. Chrysikopoulos H S. Clinical MR Imaging and Physics. 1 st edition, Berlin: Springer-Verlag; 2009.</li> </ol>
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: <a href="mailto:biofizika@mf.unsa.ba">biofizika@mf.unsa.ba</a></p>

## COURSE PLAN: PHYSICS OF MEDICAL DIAGNOSTICS

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<b>Lectures:</b> Acoustic parameter and variables. Period and frequency. Graphic representation of a single-frequency soundwave. Parameters of magnitude. Amplitude, intensity and power. Propagation speed. Wave phenomena: interference and diffraction.	1
Week 2.	<b>Lectures:</b> The piezoelectric phenomenon. Generation and detection of ultrasound. Basic instrumentation. Transducer. Master synchronizer. Pulser. Receiver.	1
Week 3.	<b>Practice: I</b> Ultrasound	2
Week 4.	<b>Lectures:</b> Scientific principles of ultrasound wave propagation and interaction with tissue. Attenuation, reflection and scattering. Acoustic impedance. Ultrasound sonography.  Spatial resolution. Axial and lateral resolution. Temporal resolution. Display modes/imaging (A, B and M- mode). Imaging artifacts.	1
Week 5.	<b>Lectures:</b> Doppler effect. Pulsed and Continuous Wave Doppler.  Limitations of ultrasound. Bioeffects. <i>Diagnostic ultrasound safety</i> .	1
Week 6.	<b>Lectures:</b> <i>Structure of atom. Orbitals and energy levels. Models of atom. Principles of quantum mechanics (physics).</i>  <i>X-ray generation. The X-ray Tubes. Crookes tube and thermionic tube. Characteristic X-ray generation. Bremsstrahlung (Braking X-ray generation). The X-ray spectrum.</i>	1

Week 7.	<b>Lectures:</b> X-Ray Attenuation. Interaction of X- ray photon(s)-tissue interaction. Rayleigh scattering. Compton scattering. Photoelectric effect. Pair production.	1
Week 8.	<b>Lectures:</b> X-Ray Detectors. Film-Based Imaging. Fluoroscopes. Contrast media. X-ray image quality. Computed tomography (CT). Hounsfield units (HU). Image Quality and Artifacts.  <b>Mid-term exam 1 (Partial exam 1)</b>	1  1
Week 9.	<b>Practice: I I</b> Bioimpedance and Biosensors Mid-term exam 1 ( Partial exam 1)/ <b>Practice</b>	2
Week 10.	<b>Lectures:</b> Nuclei and isotopes. <i>Symbols and terminology. Nuclear decay processes (alpha, beta and gamma decay). Activity and half life. Detection of gamma radiation. The Geiger-Müller tube.</i>  Biological effects of ionising radiation. Dose. Absorbed Dose. Dose equivalent. Effective dose.	1
Week 11.	<b>Practice: III</b> Ionizing radiation (GM counter)	2
Week 12.	<b>Lectures:</b> Spin and the Nuclear Magnetic Resonance Phenomenon. Proton Spins in an External Magnetic Field. Macroscopic magnetization.  Rotation. Precession and precession frequency (Larmor frequency). Excitation. Longitudinal and transverse component of macroscopic magnetisation.	1
Week 13.	<b>Lectures:</b> Resonance and Relaxation. Longitudinal or spin-lattice relaxation. Transverse or spin–spin relaxation. Relaxation times ( <i>T1</i> and <i>T2</i> ). Contrast mechanism for magnetic resonance imaging (MRI).  Advantages and disadvantages of different types of imaging. New directions in medical imaging techniques.	1
Week 14.	<b>Practise: IV</b> Medical electronics  Mid-term exam 2 (Partial exam 2) / <b>Practice</b>	2

Week 15.	<b>Mid – term 2 (Partial exam 2)</b>	1
Week 16.	<b>Final exam (regular examination term)</b>	
Weeks 17– 20.	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0607</b>	Course title: <b>CLINICAL PATHOLOGY OF SELECTED ORGAN SYSTEMS</b>		
Level: <b>Preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS : <b>1</b>
Status: <b>Elective</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the Study Regulation</b>		
Lecturers: <b>Svjetlana Radović, MD, PhD, professor of pathology</b> <b>Suada Kuskunović-Vlahovljak, MD, PhD, assistant professor of pathology</b> <b>Edina LazovićSalčin, MD, PhD, assistant professor of pathology</b>			
1. Overall aim	The overall aim of the course is to provide the students with additional knowledge about most common diseases and tumors of individual organs and organic systems, which they will meet in everyday clinical practice.  The purpose of the subject is further education of students about the importance and purpose of pathology in clinical practice.		
2. Course contents	The following topics will be covered during the Modules:  <b>Module 1. Breast pathology</b> <b>Module 2. Pathology of Female genital tract</b> <b>Module 3. Uropathology</b> <b>Module 4. Pathology of Male genital tract</b> <b>Module 5. Soft tissue pathology</b>		
3. Learning outcomes (knowledge, skills and competence)	<i>Through the lectures of Clinical pathology of selected organ systems course students will gain following <b>knowledge</b>:</i>  <b>Module 1. Breast pathology</b> The aim of the module is to familiarize students with benign and malignant lesions that affect female and male breast, its etiology, pathogenesis, clinical presentation, diagnostics and therapy.  <b>Module 2. Pathology of Female genital tract</b> The aim of the module is to familiarize students with diseases and tumors that affect female genital system, its etiology, pathogenesis, clinical presentation, diagnostics and therapy.  <b>Module 3. Uropathology</b> The aim of the module is to familiarize students with diseases and tumors that affect kidneys, bladder, urethra and ureter, its etiology, pathogenesis, clinical presentation, diagnostics and therapy.  <b>Module 4. Pathology of Male genital tract</b> The aim of the module is to familiarize students with tumors that affect male genital system, its etiology, pathogenesis, clinical presentation, diagnostics and therapy.  <b>Module 5. Soft tissue pathology</b> The aim of the module is to familiarize students with tumors which originate from soft tissue, their architectural patterns, classification and the way of approaching to diagnosis.		

	<p><i>Through the lectures of above listed modules and practical work of Clinical pathology of selected organ systems students will acquire following</i></p> <p><b>knowledge about:</b></p> <ul style="list-style-type: none"> <li>- the importance of early detection and diagnosis of the disease</li> <li>- the key role of pathohistology in tumor diagnosis, further treatment and prognosis of the patient</li> <li>- each organic system, in addition to its common characteristics, has its own specific in response to harmful agents</li> <li>- the clinical features of a process are subject to individual variations</li> </ul> <p><b>skills:</b></p> <ul style="list-style-type: none"> <li>- to detect and recognize pathological changes on particular tissue and organ</li> <li>- to link etiology, morphology and clinical findings of certain types of diseases</li> </ul>
4. Teaching methods:	<p><b>Lectures: 10 hours</b></p> <p><b>Practical work: 10 hours</b></p>
5. Methods of knowledge assessment and examination	<p>Knowledge and skills are evaluated continuously during the semester. Students are required to take a part in all forms of evaluation during the semester.</p> <p><b>Partial exam 1 (M 1-2)</b></p> <p>Partial exam 1 is in a written form with 20 multiple choice questions (MCQ) which comprise topics from Modules 1 and 2. Each correct answer is worth 2 points. The grading scale has a maximum of <b>40 points</b>. To pass the exam, the student must meet the minimum criteria by scoring <b>22 points</b>.</p> <p><b>Partial exam 2 (M 3-5)</b></p> <p>Partial exam 2 is in a written form with 30 MCQ which comprise topics from Modules 3 and 5. Each correct answer is worth 2 points. The grading scale has a maximum of <b>60 points</b>. To pass the exam, the student must meet the minimum criteria by scoring <b>33 points</b>.</p> <p><b>Final exam</b></p> <p>If the student did not complete Partial exam 1 or 2 during continued evaluation the same takes in final exam as it follows:</p> <ul style="list-style-type: none"> <li>• <b>20 MCQ for Module 1-2 (M1-2).</b> Each correct answer is worth 2 points. The grading scale has a maximum of <b>40 points</b>. To pass the exam student must meet minimal criteria by scoring <b>22 points</b>.</li> <li>• <b>30 MCQ for Module 3-5 (M3-5).</b> Each correct answer is worth 2 points. The grading scale has a maximum of <b>60 points</b>. To pass the exam student must meet minimal criteria by scoring <b>33 points</b>.</li> </ul>

	<ul style="list-style-type: none"><li>• <b>50 MCQ for Module 1-5 (M1-5).</b> Each correct answer is worth 2 points. The grading scale has a maximum of <b>100 points</b>. To pass the exam student must meet minimal criteria by scoring <b>55 points</b>.</li></ul> <p>Final exam is in written form as MCQ test. Students who are dissatisfied with gained number of points during the continuous examination can also take the final exam.</p> <p><b>Repeated/Re-sit exam</b></p> <p>Repeated/Re-sit exam is in written form as MCQ test. The repeated/re-sit exam takes place according to the previously defined criteria of the final exam.</p> <p>Final grade is determined based on the following criteria:</p> <table><tr><th>Grade</th><th>Cumulative points</th><th>Definition</th></tr><tr><td>10 (A)</td><td>95-100</td><td>Outstanding performance with only minor errors</td></tr><tr><td>9 (B)</td><td>85-94</td><td>Above the average standard but with some 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>Fair but with significant shortcomings</td></tr><tr><td>6 (E)</td><td>55-64</td><td>Performance meets the minimum criteria</td></tr><tr><td>5 (F, FX)</td><td>&lt;55</td><td>Fail (some/considerable further work is required)</td></tr></table>	Grade	Cumulative points	Definition	10 (A)	95-100	Outstanding performance with only minor errors	9 (B)	85-94	Above the average standard but with some errors	8 (C)	75-84	Average, with noticeable errors	7 (D)	65-74	Fair but with significant shortcomings	6 (E)	55-64	Performance meets the minimum criteria	5 (F, FX)	<55	Fail (some/considerable further work is required)
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5 (F, FX)	<55	Fail (some/considerable further work is required)																				
6. Literature:	<p><b>Obligatory:</b></p> <ul style="list-style-type: none"><li>– Kumar V, Abbas AK, Aster JC. Robbins &amp; Cotran Pathologic Basis of Disease, 9th ed. Elsevier; 2015.</li><li>– Handouts of the Department of Pathology</li></ul>																					
7. Remarks	<p>The maximum number of students attending lectures is 30. Consultations with teaching personnel are possible every work day.</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: <a href="mailto:suada.kuskunovic@mf.unsa.ba">suada.kuskunovic@mf.unsa.ba</a></p>																					

## COURSE PLAN: CLINICAL PATHOLOGY OF SELECTED ORGAN SYSTEMS

Week	Form of teaching	Hours
Week 1.	<b>Lecture:</b> Breast pathology- benign lesions of female and male breast (etiology, morphology, symptoms and clinical findings)  <b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)	1   1
Week 2.	<b>Lecture:</b> Breast pathology- malignant lesions of female and male breast (etiology, morphology, symptoms and clinical findings). Hormonal and HER- 2 status of breast cancer  <b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)	1   1
Week 3.	<b>Lecture:</b> Pathology of Female genital tract- benign and malignant disorders of oviduct and ovary (etiology, morphology, symptoms and clinical findings). Benign and malignant disorders of uterus (etiology, morphology, symptoms and clinical findings)  <b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)	1   1
Week 4.	<b>Lecture:</b> Pathology of Female genital tract- disorders of cervix, vaginal portion of cervix, gestational and trophoblastic disease (etiology, morphology, symptoms and clinical findings)  <b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)	1   1
Week 5.	<b>Lecture:</b> Uropathology- inflammatory disorders of kidney, ureter, bladder and urethra (etiology, morphology, symptoms and clinical findings).  <b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)	1   1
Week 6.	<b>Lecture:</b> Uropathology- tumours of the kidney, ureter, bladder and	1



	<p>urethra (etiology, morphology, symptoms and clinical findings).</p> <p><b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)</p> <p><b>First partial exam (M 1-2)</b></p>	1
Week 7.	<p><b>Lecture:</b> Pathology of Male genital tract- Inflammatory disorders of prostate, testis and penis. Sexually transmitted diseases (etiology, morphology, symptoms and clinical findings)</p> <p><b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)</p>	1 1
Week 8.	<p><b>Lecture:</b> Pathology of Male genital tract-benign and malignant tumours of prostate, testis and penis (etiology, morphology, symptoms and clinical findings)</p> <p><b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)</p>	1 1
Week 9.	<p><b>Lecture:</b> Soft tissue pathology: origin, classification, cell types, architectural patterns, approach to diagnosis.</p> <p><b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)</p>	1 1
Week 10.	<p><b>Lecture:</b> Soft tissue pathology: benign and malignant tumours originate from adipose, fibrous and muscle tissue (skeletal and smooth).</p> <p><b>Practical work:</b> Pathohistological laboratory- case study (macroscopic examination and description of bioptic material)</p> <p><b>Second partial exam (M 3-5)</b></p>	1 1
Weeks 17/18	<b>Final exam (regular examination term)</b>	
Weeks 19/20.	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination term)</b>	

Code: <b>MFSE 0608</b>	Course title: <b>FOODBORN DISEASES</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the study regulation</b>		
Lecturers: <b>Associate Professor Mufida Aljičević MD PhD</b>			
1. Overall aim	The overall aim of the Foodborne Disease Course is to increase understanding of the concept of healthy food, the importance of microbiological food safety, hygiene criteria in the process of food production as well as the etiologic pathogens (bacteria, viruses, fungi and parasites) which can cause disease if enter the food.		
2. Course contents	The following topics will be covered within the Modules:  Modules 1. General requirements for work in microbiology lab. Modules 2. Bacteria causing food transmitted diseases. Modules 3. Viruses causing food transmitted diseases. Modules 4. Mycotoxins causing food transmitted diseases. Modules5. Parasites causing food transmitted diseases.		
3. Learning outcomes (Knowledge, skills and competences)	The student will acquire knowledge necessary for understanding the importance of eating healthy food and the need to prevent food transmitted diseases. Through practical work students will learn about the diagnostic laboratory procedures in the process of regular control of food available in the market. <i>Through lectures, the students will gain following knowledge and competences:</i> <ol style="list-style-type: none"><li>1. Understand the process and responsibilities related to the general rules of work in the microbiology laboratory.</li><li>2. Distinguish which bacteria commonly cause food poisoning.</li><li>3. Distinguish which are the most common viruses in the etiology of food transmitted diseases.</li><li>4. Discover the importance of individual human-pathogenic fungi and their toxins in causing certain pathological conditions and microbiological methods application.</li><li>5. Understand the role of parasites in the etiology of food transmitted disease.</li></ol> <i>Through the practical laboratory work the students will acquire following skills:</i> <ul style="list-style-type: none"><li>- Proper sampling of various types of food</li><li>- Choosing the most appropriate media for culturing</li><li>- Verification of microbiological test methods</li><li>- Handling bacterial CRM</li><li>- Use of standard operating procedures (SOP)</li><li>- Horizontal method for the detection of <i>Salmonella spp.</i></li></ul>		

	<ul style="list-style-type: none"> <li>- Colony-count technique at 30 °C – total number colonies</li> <li>- Horizontal method for counting <math>\beta</math>-glucuronidase positive <i>E. coli</i></li> <li>- Mycotoxins – laboratory diagnostics</li> </ul>
4. Teaching methods	<p>Lectures: 10 hours</p> <p>Practical work: 10 hours</p>
5. Method of knowledge assessment and examination	<p>- Written test in the form of – Multiple choice questions (MSQ) tests and Extended response questions (ERQ) tests.</p> <p>Continuous knowledge and skills assessment will be carried out through Partial exams and Seminars.</p>
6. Literature	<p>Recommended:</p> <ol style="list-style-type: none"> <li>1. Dodd C. <i>at all.</i> Foodborne Diseases.3<sup>th</sup> Edition: Academic Press; Elsevier 2017.</li> <li>2. Carroll K. <i>at all.</i> Jawetz, Melnick &amp; Adelberg`s Medical Microbiology. 27<sup>th</sup> Edition: McGraww-Hill Education; New York 2016.</li> </ol>
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: mikrobiologija@mf.unsa.ba</p>

### COURSE PLAN: FOODBORNE DISEASES

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<b>Lecture:</b> General modes of work in microbiological laboratory. Sterilization. Laboratory equipment.	1
Week 2.	<b>Lecture:</b> Foodborne Diseases. The most common causes of contamination of food bacterial etiology: <i>Salmonella</i> , <i>Campylobacter</i> , <i>Staphylococcus</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> .	1
Week 3.	<b>Practice:</b> Preparation of culture media, and the preparation of the initial suspension. Inoculation of the culture medium, incubation, colony counting.	2
Week 4.	<b>Lecture:</b> <i>Shigella</i> , <i>Clostridium botulinum</i> , <i>Clostridium perfringens</i> , <i>Bacillus cereus</i> , <i>Brucella</i> , <i>Yersinia</i> , <i>Vibrio cholerae</i> .	1
	<b>Practice:</b> Application of standard operating procedures /SOP/	1
Week 5.	<b>Lecture:</b> The role of viruses in the etiology of foodborne diseases. <i>Rotavirus</i> . <i>Calicivirus (Norovirus)</i> , <i>Enteroviruses</i> , <i>Hepatitis A virus</i> . <i>Astroviruses</i> .	1
	<b>Practice:</b> Application of standard operating procedures /SOP/	1
Week 6.	<b>Partial exam I</b>	1
Week 7.	<b>Lecture:</b> Mycotoxins causing foodborne diseases.	1
Week 8.	<b>Lecture:</b> <i>Aflatoxins</i> , <i>Zearalenon</i> , <i>Patulin</i> , <i>Ochratoxin</i> , <i>Fumonisin</i> , <i>Trichothecene</i> .	1
	<b>Practice:</b> Laboratory diagnosis of <i>Aflatoxins</i> .	1
Week 10.	<b>Lecture:</b> Parasites causing foodborne diseases. <i>Entamoeba histolytica</i> .	1
Week 11.	<b>Lecture:</b> <i>Giardia lamblia</i> . <i>Cryptosporidium</i> . <i>Helminths</i> .	1
Week 12.	<b>Lecture:</b> Laboratory diagnosis of parasitic diseases.	1
Week 13.	<b>Lecture:</b> The effect of regular sanitary control on the microbiological safety of foods.	1

Week 14.	<b>Lecture:</b> Quality assurance of results in microbiological examinations.	1
Week 15.	<b>Partial exam II</b>	1
Weeks. 17/18	<b>Final exam (regular term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination exam)</b>	

Code: <b>MFSE 0609</b>	Course title: <b>MICROBIOLOGICAL DIAGNOSTIC TECHNIQUES</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ETCS: <b>2</b>
Status: <b>elective</b>	Weeks: <b>10</b>		Total hours: <b>20</b>
Lecturer in Charge: <b>Prof. dr Sadeta Hamzić, Prof. dr Sabina Mahmutović Vranić, Prof.dr Mufida Aljičević, Doc. dr Velma Rebić, Ass. dr Amila Abduzaimović, Dr Sajra Vinčević Smajlović</b>			
Prerequisites to attend the lectures: <b>Attended course of Medical Microbiology 1</b>			
1. Overall aim	Increase the students' understanding of the basics of certain microbiological and molecular-biological methods, their diagnostic value and timely application in diagnostics and follow-up of certain infectious diseases.		
2. Course contents	Students will acquire knowledge during the course of MICROBIOLOGICAL DIAGNOSTIC TECHNIQUES through the following modules:  <b>MODULE 1: Laboratory diagnostics of bacterial infections</b>  <b>MODULE 2: Laboratory diagnostics of parasitoses</b>  <b>MODULE 3: Laboratory diagnostics of causal agents of mycoses</b>  <b>MODULE 4: Diagnostic methods in virology</b>		
3. Learning outcomes (Knowledge, skills and competences)	Through the lectures during the optional course of MICROBIOLOGICAL DIAGNOSTIC TECHNIQUES, students will gain the following skills: <ul style="list-style-type: none"><li>• Basic laboratory procedures in bacteriology, sampling for bacteriological diagnostics, microscopic examination of bacteria, bacterial culture in laboratory conditions, basic laboratory procedures for isolation, growing and determination of bacterial features, serological diagnostics and molecular diagnostic procedures</li><li>• Methods of direct and indirect laboratory diagnostics of parasitoses</li><li>• Confirmation of causal agents of mycoses using the methods of microscopy, antigen detection and fungal culture</li><li>• Isolation of viruses from cell culture using the methods of detection of specific antibodies and the methods of detection of nucleic acids.</li></ul> After attending the lectures during the optional course of MICROBIOLOGICAL DIAGNOSTIC TECHNIQUES, students will acquire the following standpoints: <ul style="list-style-type: none"><li>• Importance of microbiological diagnostics in determination of etiological diagnosis of infectious diseases, importance of adequate choice of diagnostic methods and obtaining the results of microbiological analyses in a timely manner.</li></ul>		
4. Teaching methods	The course will be organized in the form of: <ul style="list-style-type: none"><li>• Lectures (8 hours)</li><li>• Laboratory practical work (12 hours)</li></ul>		

5. Method of knowledge assessment and examination	Continuous knowledge and skills assessment will be carried out through partial exam, written essay and practical laboratory colloquium.
6. Literature	<p>Obligatory:</p> <ol style="list-style-type: none"> <li>1. Murray P, Baron EJ, Pfaller M, Tenover R, Tenover R. Manual of Clinical Microbiology, ASM Press, Washington, DC, 2011.</li> </ol>
7. Remarks	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: mikrobiologija@mf.unsa.ba

## COURSE PLAN: MICROBIOLOGICAL DIAGNOSTIC TECHNIQUES

<b>Weeks</b>	<b>Form of Instructions and materials</b>	<b>Number of classes</b>
Week 1.	<b>Lecture:</b> Laboratory diagnostics of bacterial infections, samples for bacteriological diagnostics, basic guidelines and transport of samples from the human organism, examination of patient material.	2
Week 2.	<b>Practice:</b> Microscopic examination of bacteria.	2
Week 3.	<b>Practice:</b> Cultivation of bacteria in laboratory conditions, interpretation of bacterial cultures (morphology of bacteria).	2
Week 4.	<b>Practice:</b> Serological Diagnostics; Molecular Diagnostic Procedures.	2
Week 5.	<b>Lecture:</b> Laboratory diagnostics of parasitosis.	2
Week 6.	<b>Practice:</b> Methods of direct and indirect laboratory diagnostics of parasites	2
Week 7.	<b>Lecture:</b> Laboratory diagnostics of the cause of mycosis, taking the material properly, transport and storage of material	2
Week 8.	<b>Practice:</b> Microbiological diagnosis of candidiasis.	2
Week 9.	<b>Lecture:</b> Laboratory diagnostics of the viruses, taking the material properly, transport and storage of material in virological laboratory.	2
Week 10.	<b>Practice:</b> Diagnostic methods in virology.	2
Weeks. 17/18	<b>Final exam (regular term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination exam)</b>	



Code: <b>MFSE 0610</b>	Course title: <b>PHYSICS OF NUCLEAR MEDICINE</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the study Regulation</b>		
Lecturers: Associate Professor Mustafa Busuladžić PhD, Assistant Zijad Muharemović MSc			
1. Overall aim	The overall aim of Physics of Nuclear Medicine Course is to give students physical and technical background to ensure they will understand how nuclear medicine works.		
2. Course contents	The following topics will be covered during the Modules:  Module 1: Fundamentals in nuclear physics <i>Module 2: Interaction of radiation with matter/tissue</i> <i>Module 3: Basic physics of nuclear medical imaging</i> <i>Module 4: Radiation dosimetry</i>		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge to describe the structure of matter, modes of radioactive decay, particle and photon emissions, and interactions of radiation with matter. They will be able to understand how image quality and patient dose are affected by these interactions. Also, students will be able to describe the instrumentation, major components, and principles of operation for instruments commonly used for detecting, measuring, and imaging radioactivity.</p> <p>In our physics laboratory students will practice with computer simulation software. They will also acquire the skills of working with real devices and equipment.</p> <p><i>Through the lectures and seminars the students will gain following knowledge and competences:</i></p> <ol style="list-style-type: none"><li>1. Understand the basic nuclear structure, different transformation processes, statistical nature of radiation measurement and statistics of radiation counting.</li><li>2. Comprehend interaction between radiation and matter/tissue.</li><li>3. Discuss the characteristics of electronics related to nuclear medicine devices (PET and SPECT).</li><li>4. Learn about the methods and approaches for implementation of a radiation protection program.</li></ol> <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"><li>- Application of biostatistics in radiology</li><li>- Measurement of interaction of gamma radiation with matter</li><li>- Identification of electronic amplifiers and semiconductor detectors for medical diagnostic</li><li>-Biological dosimetry</li></ul>		
4. Teaching methods	Lectures: 10 hours Practical work: 10 hours		
5. Method of	-Written tests in the form of Multiple choice questions (MCQ) tests		

knowledge assessment and examination	<p>Extended response questions (ERQ) tests</p> <p>-Oral examination</p> <p>Continuous knowledge and skills assessment will be carried out through Partial exams, Seminars and Practical laboratory Colloquium.</p>
6. Literature	<p>Recommended:</p> <ol style="list-style-type: none"> <li>1. Saha G B. Physics and Radiobiology of Nuclear Medicine. 4 th edition, New York: Springer; 2013.</li> <li>2. Kane S A. Introduction to Physics in Modern Medicine. 2 nd edition, New York: CRC Press; 2009.</li> </ol>
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: <a href="mailto:biofizika@mf.unsa.ba">biofizika@mf.unsa.ba</a></p>

Weeks	<b>COURSE PLAN: PHYSICS OF NUCLEAR MEDICINE</b>  <b>Form of Instructions and materials</b>
Week 1.	Lectures: Radioactivity and medicine. The history of radiation use in medicine. Terms and definitions in nuclear medicine.
Week 2.	Lectures: Structure of the Nucleus. Nuclear Binding Energy. Nuclear Nomenclature. Chart of the Nuclides.
Week 3.	Lectures: Radioactive Decay. The decay constant. Alpha ( $\alpha$ )-Decay. Beta ( $\beta^-$ )-Decay. Positron ( $\beta^+$ )-Decay. Electron Capture.
Week 4.	Lectures: Radioactive Decay Equations. Radioactivity. Activity. Half-Life. Mean Life. Effective Half-Life. Successive Decay Equations.
Week 5.	Practice: I Statistics of Radiation Counting. Error, Accuracy, and Precision.
Week 6.	Practice: II Mean and Standard Deviation. Standard Deviation of Count Rates. Minimum Detectable Activity.
Week 7.	Mid – term 1 (Partial exam 1)  Mid-term exam 1 ( Partial exam 1)/Practice
Week 8.	Lectures: Production of Radionuclides. Cyclotron-Produced Radionuclides. Reactor-Produced Radionuclides. Fission. Neutron capture. Interaction of Radiation with Matter. Interaction of Charged Particles with Matter. Specific Ionization. Bragg ionization (Bragg peak). Linear Energy Transfer. Range. Bremsstrahlung. Annihilation.
Week 9.	Lectures: Interaction of $\gamma$ -Radiations with Matter. Mechanism of Interaction of $\gamma$ -Radiations. Attenuation of $\gamma$ -Radiations Linear and Mass Attenuation Coefficients. Half-Value Layer. Interaction of Neutrons with Matter.

Week 10.	Practice: I I I Interaction of gamma radiation with matter.
Week 11.	Practice: IV Electronic amplifiers and semiconductor detectors.
Week 12.	Lectures: Single Photon Emission Computed Tomography. Data Acquisition. Image Reconstruction. SPECT/CT.  Positron Emission Tomography. PET Radiopharmaceuticals. PET Scanners. PET/CT Scanners.
Week 13.	Lectures: PET/MR Scanners. Principles of MR Imaging. MR scanner. Micro-PET. Time of Flight Method. Image Reconstruction. Spatial Resolution.  New Horizons in Molecular Imaging/Nuclear Medicine.
Week 14.	Practise: V Biological dosimetry
Week 15.	Mid – term 2 (Partial exam 2)  Mid-term exam 2 (Partial exam 2) /Practice
Week 16.	Final exam (Regular term)
Weeks 17–20.	Final exam (Make-up exam)
September	Final exam (September examination term)

Code: <b>MFSE 0611</b>	Course title: <b>PSYCHOACTIVE SUBSTANCE ABUSE</b>		
Level: preclinical	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Lecturers: <b>Assistant Professor Aida Kulo Ćesic MD PhD, Full Professor Svjetlana Loga-Zec MD PhD, Associate Professor Jasna Kusturica MD PhD, Associate Professor Maida Rakanović-Todić MD PhD, Assistant Professor Lejla Burnazović-Ristić MD PhD, Assistant Sanita Maleškić MD</b>			
Prerequisites: <b>According to the study regulation</b>			
1. Overall aim	The overall aim of the Psychoactive Substance Abuse Course is to gain an understanding of mechanisms of psychoactive substance abuse and addiction, as well as preventive and treatment measures		
2. Course contents	The following topics will be covered within the Modules: Module 1. The problem of psychoactive substance abuse  Module 2. Properties of psychoactive substances  Module 3. Abuse monitoring		
3. Learning outcomes (Knowledge, skills and competences)	Students will acquire knowledge necessary for understanding identifying factors and different preventive and pharmacological methods for psychoactive substance abuse.  <i>Through the lectures and seminars, the students will gain following knowledge and competences:</i> 1. Understand the problem of psychoactive substance abuse, addiction and history of abuse. 2. Understand the properties of the most commonly abused psychoactive substances, as well as overdose treatment and addiction. 3. Understand the methods of testing for drugs/alcohol.  <i>Through the practical work students will acquire following skills:</i> - Recognizing the clinical signs and symptoms of overdose and addiction - Treatment of overdose and addiction		
4. Teaching methods	Lectures: 10 hours  Seminars: 10 hours		
5. Method of knowledge assessment and examination	Continuous knowledge and skills assessment will be carried out through participation in debates, PBL sessions and Partial exam in the form of written test with extended response questions (ERO)  <b>Continuous assessment of knowledge:</b>  <b>Participation in the debate</b> (each student participates in one debate). For a successful debate: minimum 10 points; maximum 20		

	<p>points.</p> <p>Criteria for scoring participation in debate:</p> <ul style="list-style-type: none"> <li>- preparation: up to 5 points (scored by students within the group)</li> <li>- presentation: up to 5 points</li> <li>- answers: up to 10 points</li> </ul> <p><b>PBL sessions</b> (each student participates in two sessions), one session carries 15 points. For successful PBL sessions: minimum 17 points; maximum 30 points.</p> <p>Criteria for scoring participation in PBL session:</p> <ul style="list-style-type: none"> <li>- team work (cooperation, support, assistance): up to 3 points</li> <li>- contribution to problem solving: up to 6 points</li> <li>- presentation and discussion: up to 6 points</li> </ul> <p><b>Partial exam</b> (written test of knowledge with ERO for modules 1-3): for a successful test: maximum 50 points, minimum 28 points.</p> <p>Criteria for scoring the ERO test: up to 5 points per question/answer.</p> <p><b>Final exam</b></p> <p>For students who did not pass any of the parts of a continuous knowledge and skills assessment.</p> <p>Knowledge covered by the debate or PBL session will be examined in writing (essay) and the rest will be examined by written test of knowledge with ERO.</p> <p>The final grade is formed by summing up all the points earned for each form of knowledge checking (minimum 55, maximum 100 points).</p>
6. Literature	<p>Recommended:</p> <ul style="list-style-type: none"> <li>– Rang HP, Dale MM, Ritter JM, Flower JR, Henderson G. Pharmacology. 8th edition, Elsevier Inc.; 2015.</li> <li>– Dasgupta A et al. Handbook of Drug Monitoring Methods. Therapeutics and Drugs of Abuse. Humana Press Inc.; New Jersey 2008.</li> </ul>
7. Note	<p>The maximum number of students to attend the course is 20.</p> <p>Consultations will be possible every day from 12 to 13 h., with advance notice to the secretary of the Department or by e-mail: <a href="mailto:farmakologija@mf.unsa.ba">farmakologija@mf.unsa.ba</a></p> <p>In case of absences from teaching, the procedure defined by actual legal regulations will be followed.</p>

## COURSE PLAN: PSYCHOACTIVE SUBSTANCES ABUSE

Week	Lecture/Practical
6	<b><u>Lecture, 2 hours:</u></b> Psychoactive substances, Definitions; History; The consequences and prevention of their abuse Psychoactive substances with depressive effects on CNS (morphine, heroin, codeine): abuse and treatment
7	<b><u>Practical, 2 hours:</u></b> Strategy against narcotics
8	<b><u>Lecture, 2 hours:</u></b> Psychoactive substances with stimulation effects on CNS (amphetamine, cocaine) and of cannabinoids: abuse and treatment
9	<b><u>Practical, 2 hours:</u></b> PBL: Stimulants abuse and treatment
10	<b><u>Lecture, 2 hours:</u></b> Psychoactive substances with depressive effects on CNS (barbiturates, benzodiazepines): abuse and treatment
11	<b><u>Practical, 2 hours:</u></b> <b>Debate:</b> Marijuana legalization: pros and cons
12	<b><u>Lecture, 2 hours:</u></b> Nicotine and caffeine: abuse and treatment
13	<b><u>Practical, 1 hour</u></b> PBL: Nicotine and caffeine: abuse and treatment <b><u>Practical, 1 hour:</u></b> <b>Debate:</b> Drug testing at school and at random: pros and cons
14	<b><u>Lecture, 2 hours:</u></b> Alcohol: abuse and treatment Proofing the abuse of psychoactive substances
15	<b>PARTIAL EXAM</b>
17/18	<b>Final exam (regular term)</b>
19/20	<b>Final exam (make-up examination term)</b>
September	<b>Final exam (September examination term)</b>

Code: <b>MFSE 0612</b>	Course title: <b>Sexually Transmitted Diseases</b>
Level: <b>preclinical</b>	Study year: <b>III</b> Semester: <b>VI</b> ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: 20
Prerequisites:	<b>According to the study regulation</b>
Lecturers:	Associate Professor Sabina Mahmutović Vranić MD PhD, Associate Professor Mufida Aljičević MD PhD, Assistant Professor Velma Rebić MD PhD, Assistant Amila Abduzaimović MD
1.Overall aim	The overall aim of the Sexually Transmitted Diseases Course is to increase the understanding of sexually transmitted diseases.
2.Course contents	<p>The following topics will be covered within the Modules:</p> <p>Module 1. Sexually transmitted diseases and the most prevalent pathogens</p> <p>Module 2. Sexually transmitted diseases and laboratory surveillance</p> <p>Module 3. Human papilloma viruses</p> <p>Module 4. Chlamydial infections</p> <p>Module 5. HIV/AIDS in the world and in B&amp;H-measures of prevention and control</p> <p>Module 6. Who is the risk population for STD/HIV-risk factors?</p>
3.Learning outcomes (Knowledge, skills and competences)	<p>Students will be able to increase understanding of the most prevalent STD pathogens, the principles of early detection, available diagnostics, risk factors, therapeutic approaching to patients, concerning personality, socio-demographic factors of the environment, "core" group, and the stigmatization problem.</p> <p><i>Through the lectures the students will gain the following knowledge:</i></p> <ol style="list-style-type: none"> <li>1. Describe the presented diseases/infections, their epidemiology, prevention and control.</li> <li>2. Know about specimens collection and handling.</li> <li>3. Learn how to improve identification procedures: microscopy detection, cultivation, biochemical identification, and serology.</li> <li>4. Learn how to interpret and report results.</li> <li>5. Identify risk factors and clearly define them.</li> <li>6. Define the risk population for STD/HIV.</li> </ol> <p><i>Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>- Specimens sampling and handling</li> <li>- Recognition of risk factors and risk population</li> <li>- Identification of relation among papilloma genotypes and appearance of cervical cancer</li> </ul>
4.Teaching methods	<p>Lectures: 10 hours</p> <p>Laboratory practical work: 10 hours</p>
5.Method of knowledge assessment and examination	<ul style="list-style-type: none"> <li>- Written test in the form of - Multiple choice questions (MCQ) tests and Extended response questions (ERQ) tests.</li> <li>- Oral examination</li> </ul> <p>Continuous knowledge and skills assessment will be carried out</p>



	through Partial exam, Seminars and Practical laboratory Colloquium.
6.Literature	<p>Recommended:</p> <ol style="list-style-type: none"> <li>1. Carroll, K. (2016). <i>Jawetz, Melnick &amp; Adelberg's medical microbiology</i>. 1st ed. New York: McGraw-Hill Education.</li> </ol>
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: <a href="mailto:mikrobiologija@mf.unsa.ba">mikrobiologija@mf.unsa.ba</a></p>

### COURSE PLAN: SEXUALLY TRANSMITTED DISEASES

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<b>Lecture:</b> An introduction to the problem of sexually transmitted diseases (STDs), the most common causes, diagnostic procedures, epidemiology and prevention. Sexually transmitted diseases-where we are today. Vaginitis.	2
Week 2.	<b>Practice:</b> STD diagnostic procedures available to us: microscope slides. Sampling of materials, processing.	2
Week 3.	<b>Lecture:</b> Gonorrhea. Syphilis.	2
Week 4.	<b>Practice:</b> Laboratory diagnostics of <i>N. gonorrhoeae</i> . Laboratory diagnostics of <i>T. pallidum</i> .	2
Week 5.	<b>Lecture:</b> STDs and laboratory surveillance by microbiological laboratories. <i>Papillomaviridae</i> , risk-factors, prevention.	2
Week 6.	<b>Practice:</b> Standardization and quality assurance of STD management. Molecular diagnostics procedures of HPVs	2
Week 7.	<b>Lecture:</b> Chlamidial infections-introduction. <i>Chlamydia trachomatis</i> infections of the adults and the newborns.	2
Week 8.	<b>Practice:</b> Laboratory diagnostics of <i>Chlamydia trachomatis</i> . Screening tests.	2
Week 9.	<b>Lecture:</b> <i>Retroviridae</i> , HIV/AIDS.	1
	<b>Partial exam 1 hour</b>	1
Week 10.	<b>Practice:</b> ELISA, Western blot, PCR.	1
	<b>Colloquium 1 hour</b>	1
Week 11.		
Week 12.		
Week 13.		
Week 14.		
Week 15.		
Weeks. 17/18	<b>Final exam (regular term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination exam)</b>	

Code: <b>MFSE 0614</b>	Course title: <b>Oxidative stress in human pathophysiology</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Total contact hours: <b>20</b>		
Prerequisites:	<b>According to the Study Regulation</b>		
Lecturers: <b>Assistant Professor Almir Fajkić</b>			
1. Overall aim	The overall aim of Oxidative stress in human pathophysiology course is to gain knowledge about the role of oxidative stress reactions in pathophysiological processes.		
2. Course contents	<p>The following topics will be covered during the Modules:</p> <p><b>Module 1. Introduction to oxidative stress</b> This module will highlight the concept of oxidative stress, including the physiological and pathological role of reactive species. It will examine the basic biochemical mechanisms involved in oxidative stress and injury and describe how the human body can protect itself against oxidative stress.</p> <p><b>Module 2. Oxidative stress in cardiovascular, respiratory and blood disorders</b>  The aim of the module is to introduce a student with the role of oxidative stress in cardiovascular, respiratory and blood pathophysiology.</p> <p><b>Module 3. Oxidative stress in renal, liver and metabolic disorders</b> The aim of the module is to determine the significance of oxidative stress tests in the diagnosis of renal, liver and metabolic disorders.</p> <p><b>Module 4. Oxidative stress in endocrine and neuropsychiatric diseases</b> The aim of the module is to introduce a student with the role of oxidative stress in the endocrine and neuropsychiatric diseases.</p> <p><b>Module 5. Aging, carcinogenesis and oxidative stress</b> The aim of the module is to introduce a student with the role of oxidative stress in aging and carcinogenesis.</p>		
3. Learning outcomes (Knowledge, skills and competences)	<p>Students will acquire knowledge necessary for understanding the possible role of oxidative stress in the development of human disease.</p> <p>Through practical work the students will understand the task of defining key words to search for literature, proper selection of the available information through critical approach and adequate</p>		

	<p>presentation of the findings from a given field.</p> <p><i>Through the lectures the students will acquire the following knowledge and competences:</i></p> <ul style="list-style-type: none"> <li>- Learn the function of oxidative stress in human pathophysiology</li> <li>- Discover novel biomarkers of oxidative stress reactions and gain the insights in their role in specific human diseases</li> <li>- Understand importance of early detections of oxidative stress processes as a key role of pathophysiological confirmation, as well as specific characteristics of some disorders that give specific clinical features.</li> <li>- Gain the insights in oxidative stress process during the aging and carcinogenesis</li> <li>- Learn that the ability to predict changes in oxidative stress reactions is an integrative approach.</li> <li>- Learn that the correct interpretation of the oxidative stress markers requires an interdisciplinary approach.</li> </ul> <p><i>- Through the practical laboratory work students will acquire following skills:</i></p> <ul style="list-style-type: none"> <li>- Discover methods for assessment of oxidative stress markers, clinical relevance of diagnostic methods</li> <li>- Interpretation of the oxidative stress markers changes in specific conditions</li> <li>- Searching relevant databases and select the required information</li> </ul>
4. Teaching methods	<p>Lectures 10 hours</p> <p>Practical work: 10 hours</p>
5. Method of knowledge assessment and examination	<p>Student knowledge checking will be carried out continuously during the course.</p> <p><b>Practical exam</b></p> <p>Practical exam includes assessment of skills acquired through all the modules. Evaluation of acquired skills is done through the extended response questions (ERQ). The total number of points the student can earn in this part of the continuous knowledge testing is 40. The student must earn at least 22 points in order for the Practical exam to be considered successful.</p> <p><b>Partial exam</b></p> <p>It covers the examination of knowledge passed through modules 1-6 in the form of essay with 3 questions. The total number of points the student can earn in this part of the continuous knowledge testing is 60. The student must earn at least 33 points in order for the Partial</p>

	<p>exam to be considered successful. Achieved points are added to other points and together form the final grade.</p> <p><b>Final exam</b> If a student fails to pass the practical and/or partial exam during the academic session, it will be retaken during the final exam. The final exam has the same structure as the practical and partial exams.</p> <p><b>Repeated and Remedial exam</b> Repeated and Remedial exam take place according to previously defined criteria of the final examination.</p> <p><b>Forming a final grade</b> The total number of points won on all forms of knowledge testing is translated into the final grade as follows:</p> <table><tr><th>Grade</th><th>Number of points</th><th>Description Grade</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 average, with some mistakes</td></tr><tr><td>8 (C)</td><td>75-84</td><td>average, with subtle 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>&lt; 55</td><td>does not meet the minimum criteria</td></tr></table>	Grade	Number of points	Description Grade	10 (A)	95-100	remarkable success without mistakes or with minor errors	9 (B)	85-94	above average, with some mistakes	8 (C)	75-84	average, with subtle 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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6. Literature	<p>Recommended</p> <p>1. Martin Rodriguez-Porcel Alejandro R. Chade Jordan D. Miller. Oxidative Stress in Applied Basic Research and Clinical Practice: Studies on Atherosclerosis. New York: Springer Science+Business Media; 2017.</p> <p>2. Jordi Gracia-Sancho, Josepa Salvado. Gastrointestinal Tissue Oxidative Stress and Dietary Antioxidants. London: Academic Press is an imprint of Elsevier; 2017.</p> <p>3. Mohinder Bansal, Naveen Kaushal. Oxidative Stress Mechanisms and their Modulation. India: Springer; 2014.</p>																					

	<p>4. Rosângela F.F de Araújo, Danyelly Bruneska G. Martins and Maria Amélia C.S.M. Borba Oxidative Stress and Disease. IntechOpen; 2016.</p> <p>5. Amitava Dasgupta, Kimberly Klein. Antioxidants in Food, Vitamins and Supplements Prevention and Treatment of Disease. San Diego: Elsevier Inc; 2014.</p> <p>6. Emanuele Albano, Maurizio Parola. Oxidative Stress in Applied Basic Research and Clinical Practice: Studies on Hepatic Disorders Switzerland: Springer International Publishing; 2015.</p> <p>7. Frederick A. Villamena Molecular basis of oxidative stress: chemistry, mechanisms, and disease pathogenesis New Jersey: John Wiley &amp; Sons, Inc; 2013.</p>
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:</p> <p><a href="mailto:patoloska.fiziologija@mf.unsa.ba">patoloska.fiziologija@mf.unsa.ba</a></p>

## COURSE PLAN: OXIDATIVE STRESS IN HUMAN PATHOPHYSIOLOGY

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<b>Lecture:</b> Introduction to oxidative stress. Oxidative stress causes and sources. Cellular redox status: free radicals and oxidative stress. Physiological significance of oxidative stress. Role of antioxidants.	2
Week 2.	<b>Lecture:</b> Physiological significance of oxidative stress. Role of antioxidants.	1
Week 3.	<b>Practical work:</b> Physiological markers of oxidative stress. Modern methods in oxidative stress research.	1
Week 4.	<b>Lecture:</b> Oxidative stress and cardiovascular diseases	1
Week 5.	<b>Lecture:</b> Oxidative stress and antioxidant imbalance in respiratory disorders. Oxidative stress and blood disorders.	1
Week 6.	<b>Practical work:</b> Case studies. Association between oxidative stress and atrial fibrillation. Essential hypertension and oxidative stress. Oxidative stress in chronic obstructive pulmonary disease: a lung and systemic process. Biomarkers of oxidative stress and antioxidants in severe asthma.	2
Week 7.	<b>Practical work:</b> Case studies. Oxidative stress in patients with iron deficiency anemia. Oxidative stress response induced by chemotherapy in leukemia treatment.	1
Week 8.	<b>Lecture:</b> Oxidative stress and renal disease. Oxidative stress and liver pathophysiology	1
Week 9.	<b>Practical work:</b> Case studies. Role of reactive oxygen species in pathogenesis of nephrotic syndrome. Effect of oxidative stress in patients with chronic renal failure	1
Week 10.	<b>Lecture:</b> Oxidative stress in metabolic disorders/diseases.	1

Week 11.	<b>Practical work:</b> Case studies. Oxidative stress in metabolic syndrome.	1
Week 12.	<b>Lecture:</b> Oxidative stress and endocrine disorders. Oxidative stress in neuropsychiatric disorders. Oxidative stress and aging. Oxidative stress and carcinogenesis	2
Week 13.	<b>Practical work:</b> Case studies. The evaluation of selected oxidative stress parameters in patients with hyperthyroidism. Oxidative stress in Graves' disease.	1
Week 14.	<b>Practical work:</b> Case studies. Evidence of oxidative stress in progressive multiple sclerosis. Oxidative stress in patients with Alzheimer's disease. Oxidative stress in patients with schizophrenia.	2
Week 15.	<b>Practical exam</b>  <b>Partial exam</b>	1 1
Weeks 17/18	<b>Final exam (regular examination term)</b>	
Weeks 19/20	<b>Final exam (make-up examination term)</b>	
September	<b>Final exam (September examination exam)</b>	



Code: <b>MFSE 0615</b>	Course title: <b>IMMUNOGENETICS</b>		
Level: <b>preclinical</b>	Study year: <b>III</b>	Semester: <b>VI</b>	ECTS: <b>1</b>
Status: <b>elective</b>	Weeks : <b>15</b>		Total contact hours: <b>20</b>
Lecturers:: Resaerch Assistant Mirela Mačkić-Đurović, Assistant Professor Izeta Aganović-Mušinović			
Prerequisites: <b>According to the Study Regulation</b>			
1. Overall aim	Expand the theoretical knowledge on genetic immunological properties, oncogenesis, and immunogenetic fundamental knowledge about the gene. A primary aim of the module is to provide knowledge about hereditary basis of immunological properties.		
2. Course contents	The acquired knowledge will enable students to: - understand the importance and share genetic basis of immunological properties; - understand the importance of major histocompatibility complex in certain therapeutic procedures (latest principles of gene therapy); - determine the correlation significance between the HLA system and some diseases.		
3.Learning outcomes (Knowledge, skills and competence)	<p>The acquired knowledge will enable students to:</p> <p><b>Module 1. Immunogenetics system</b></p> <p>Module objectives are to extend the tudent's knowledge about the basics and the importance of the imunogenetics system; the importance and role of genetics in the immunoglobulins biosynthesis.</p> <p><b>Modul 2. Imunogenetics of the human major histocompatibility complex (MHC)</b></p> <p>Module objectives are to gain the knowledge of theMHC molecule genetic constitution on a specific chromosome region; the HLA system basic genetic characteristics; the role of polymorphisms and HLA genotype.</p> <p><b>Modul 3. Genetic Methods of HLA Typing</b></p> <p>The aim of the module is to acquire knowledge about immunogenetic diagnostic methods; HLA alleles typing; significance of DNA chips in diagnosis of immunological diseases.</p> <p><b>Through the practical laboratory work students will acquire following skills:</b></p> <p>- Interpretation of the HLA typing results and understanding it's importance in various diseases and therapy.</p> <p>- Search, find and understand relevant literature.</p> <p><b>Through the lectures and seminar, the students will gain following knowledge and competences:</b></p> <p>-Recognition of relevant diseases based on the results of HLA typing interpretations.</p> <p>-Standalone select and analyze relevant informations and use them properly in setting diagnosis or in analysing the findings of HLA typing.</p>		

4. Teaching methods	<p>The Course will include:</p> <ul style="list-style-type: none"><li>• Lectures: 8 hours</li><li>• Seminars: 8 hours</li><li>• Practical work: 4 hours</li></ul>																					
	<p>As part of the teaching process, continuous assessment will be carried out. <b>Continuous assessment includes assessment of:</b> Theoretical classes, seminars and gained knowledge.</p> <p><b>Partial examination</b> Examination is conducted in writing, - test with 32 MCQ and four essays. Each correct answer to the question MCQ carries 2 points. The student needs to acquire a minimum of 33 points to pass the exam. The maximum number of points that student can gain on the MCQ test is 64. Each essay carries 4 points, and the maximum number of points that can be achieved is 16, and the minimum is 8.5. The maximum number of points is 80. Actual number of points is added to the points of the seminar, in the formation of the final grade. A student who fail the partial exam / exams, is obligated to take the final exam.</p> <p><b>Seminars</b> During the seminar are evaluated acquired skills through 3 default seminars. It should be estimated the presence, activity and demonstrated knowledge of each student. The maximum number of points that can be achieved is 20 points.</p> <p><b>Final exam</b> The final exam consists of two parts: Partial and essay part. On the final exam students are taking the examination part that they haven't passed previously. Students that have achieved all proposed points during the course of continuous assessment will not take the final exam.</p> <p><b>Re-exam</b> If a student did not pass the exam during the continuous assessment or the final exam, he is obligated to take re-exam. On re-exam students should take part in examination that they have previously failed to pass.</p> <p><b>The grade is formed</b> in a way that archived points are counted for each type 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 success without mistakes or minor mistakes</td></tr><tr><td>9 (B)</td><td>85-94</td><td>Above average with a 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 deficiencies</td></tr><tr><td>6 (E)</td><td>55- 64</td><td>Satisfy minimal criteria</td></tr><tr><td>5 (F,FX)</td><td>&lt; 55</td><td>Un-satisfy minimal criteria</td></tr></table>	Grade	Number of points	Grade description	10 (A)	95-100	Extraordinary success without mistakes or minor mistakes	9 (B)	85-94	Above average with a few mistakes	8 (C)	75-84	Average, with notable mistakes	7 (D)	65-74	Generally good with significant deficiencies	6 (E)	55- 64	Satisfy minimal criteria	5 (F,FX)	< 55	Un-satisfy minimal criteria
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6. Literature	<p>Recommended: -Christiansen, Frank T., Tait, Brian D. Immunogenetics Methods and Applications in Clinical Practice. Humana Press, 2012. Additional: Handouts from the lectures Recommended literature available on net.</p>																					
7. Notes	<p>All proposed teaching types are obligatory. Students may have a number of absences prescribed by regulations. Lectures, seminars and Practical work will be held in Center for Genetics.</p>																					

	<p>Student office hours are published in a separate schedule which can be found on the on faculty website. Pre-agreed consultations are obligatory, and can be scheduled with the Department's secretary or via e-mail: <a href="mailto:Izeta.aganovic@mf.unsa.ba">Izeta.aganovic@mf.unsa.ba</a></p>
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## COURSE PLAN: IMUNOGENETICS

Weeks	Form of Instructions and materials	Number of classes
Week 1.	<b>Lecture:</b> Overview of Immunology; Immunology recognition	2
Week 2.	<b>Lecture:</b> Innate Immunology; Immune system organs	2
Week 3.	<b>Seminar:</b> Cells of the Immune System <b>Demonstrated laboratory method:</b> Flow cytometry	2 1
Week 4.	<b>Lecture:</b> Antigens; Genes and Antigens of Histocompatibility; Complement <b>Practical work:</b> Polymerase Chain Reaction (PCR); Electrophoresis, Immunoelectrophoresis and Western blott	2 2
Week 5.	<b>Seminar:</b> Structure and features of antibodies and antigen receptor of B cells; Humoral Immunity <b>Practical work:</b> Polymerase Chain Reaction (PCR); Electrophoresis, Immunoelectrophoresis and Western blott	2 2
Week 6.	<b>Lecture:</b> Physiologic course and immune reaction regulation; Interaction between immune cells. <b>Practical work:</b> Agglutination method: CRP	2 2
Week 7.	<b>PARTIAL EXAM I</b> <b>Practical work:</b> Enzyme Linked Immuno Sorbent Assay - ELISA	2 2
Week 8.	<b>Lecture:</b> T-cell development, structure of TCR; activation and life-span of T lymphocytes; Cell Immunity <b>Practical work:</b> Enzyme Linked Immuno Sorbent Assay - ELISA	2 2
Week 9.	<b>Lecture:</b> Cytokines and Chemokines- their impact and function <b>Demonstrated laboratory method:</b> Precipitation and complement fixation reaction	2 1
Week 10.	<b>Seminar:</b> Immunotolerance; Autoimmunity <b>Practical work:</b> Immunofluoresence and ENA-6 profile	2 2

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