FACULTY OF STOMATOLOGY

STUDY PROGRAM 0911.1 STOMATOLOGY

DEPARTAMENT OF MICROBIOLOGY AND IMMUNOLOGY

APPROVED
at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum Faculty of Stomatology
Minutes No.___ of _____
Chairman PhD., associate profesor

Stepco Elena_____

APPROVED
at the Council meeting of the Faculty of Stomatology
Minutes No.___ of _____
Dean of Faculty of Stomatology
PhD., associate profesor

Solomon Oleg _____

APPROVED
at the meeting of the Discipline of microbiology and immunology
Minutes No. 2 of 14.09.2021
Head of Discipline, PhD, Professor, academician

Rudic Valeriu _____

SYLLABUS

Discipline: **MICROBIOLOGY, VIROLOGY, IMMUNOLOGY**

Integrated studies

Type of course: **Compulsory**

Curriculum developed by the team of authors:

Rudic Valeriu, PhD, Professor, academician

Bălan Greta, PhD, associate professor

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I. INTRODUCTION

General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program.

The Microbiology, Virology, Immunology Course is aimed at acquiring basic knowledge in fundamental microbiology and its goal is to study the laws of general microbiology (morphology, ultrastructure, physiology, ecosystem relationships, infection, infectious process), the basis and principles of microorganism specific and non-specific immunity, immunochemistry and immunobiology techniques, the principles of immunoprophylaxis and special immunotherapy.

The objectives of the Microbiology, Virology, Immunology Course are to form competencies in the basic areas of medicine: medical research, microbiologic diagnostic and infection epidemiology, etiology study, and the interpretation of certain minimally required diagnostic techniques for bacterial and viral diseases.

The Microbiology, Virology, Immunology Course is meant to help the future medical doctors to know the relationship between microorganism→macroorganism→ microbiologic techniques→result according to the current occupational requirements.

Mission of the curriculum (aim) in professional training

The role of the Microbiology, Virology, Immunology Course is to provide the students with theoretical knowledge and practical skills that will help them use microbiological research in their stomatological practices. The second objective is to ensure an understanding of mechanisms and microbial nutrition and microbial respiration, multiplication and biochemical activity in correlation with the oral microbiota. A third objective is to understand the microorganism→macroorganism mechanisms and the importance of this relationship.

- Language (s) of the course: English.
- Beneficiaries: students of the II nd year, Faculty of Stomatology.

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline		**F.03.O.034**	
Name of the discipline		Microbiology, Virology, Immunology	
Person in charge of the discipline		**Valeriu Rudic,** PhD., associate profesor	
Year	II	Semester	**III**
Total number of hours, including:			**90**
Lectures	**17**	Practical hours	**17**
Seminars	**17**	Self-training	**39**
Form of assessment	**C**	Number of credits	**3**

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the end of the discipline study the student will be able to:

at the level of knowledge and understanding:

- Theoretical basis of dental microbiology.
- To know the principles of classification and nomenclature of microorganisms.
- To know the morphology, structure and physiology of bacteria and viruses.
- To know the main families of antibiotics (classification, mechanism of action, spectrum(range) of activity).
- To know the mechanisms of antibiotic resistance.
- To know parameters of activity of antibiotics in vitro (MIC,MBC,antibiotic sensitivity test).
- To know the habitat of bacteria.
- To know the pathogenicity of bacteria and to understand the role of virulence factors in the pathogenesis of infectious diseases.
- To understand the importance of bacteria and viruses as etiological agents of different infectious clinical entities(or diseases).
- Specific prophylaxis and treatment of infectious diseases.
- To know the methods of microbiological diagnosis.
- To know the basic notions(concept) of fundamental and medical immunology.

at the application level:

- Differentiation of cellular and acellular forms of life;Dexterity to collect samples to be analyzed for microbiological investigations;
- Differentiation of the eukaryotic cell from the prokaryotic cell;
- Abilities of respectation? the rules of the antiepidemic regime and the safety technique in the microbiological laboratories;
- Dexterity of harvesting of samples to be analyzed for microbiological investigations;
- Skills for completing the template forms for microbiological analysis;*at the integration level:*
- Interpretation skills of microbiological analysis results;
- Dexterity of preparation and staining of smears from pure bacterial cultures;
- Ability of using the optical microscope with immersion.

at the integration level:

- Microbiological knowledge gained in the context of the future profession;

- Understanding the interconnection between microbiology and other related disciplines;
- Implementation and integration of microbiological knowledge in dental disciplines;
- Implementation of gained knowledge in the research activity;
- Using of scientific information obtained using the new information and communication technologies;
- Using multimedia technology to receive, estimate, store, produce, present and exchange information, and communicate over the Internet.

IV. PROVISIONAL TERMS AND CONDITIONS

Student of the second year requires the following:

- to know the language of instruction;
- for the knowledge of microbiology and immunology, for the conceptual, methodological and factual support is necessary the contribution of chemistry, biochemistry, physics, biophysics, physiology, genetics, cellular and molecular biology;
- digital skills (use of the Internet, document processing, electronic tables and presentations, use of graphics software);
- ability to communicate and teamwork;
- qualities - tolerance, compassion, autonomy.

V. THEMES AND ESTIMATE ALLOCATION OF HOURS

Lectures, practical hours/ laboratory hours/seminars and self-training

No. d/o	THEME	Nr of hours		
		Lectures	Seminars	Self-training
1.	Introduction to microbiology. Classification and nomenclature of bacteria. Morphology of bacteria. The microbiological laboratory. Rules and anti-epidemic measures in the microbiological laboratory.	1	2	2
2.	Ultrastructure of bacteria. Chemical composition, biological functions and methods for highlighting permanent structural elements.	2	2	2
3.	Ultrastructure of bacteria. Chemical composition, biological functions and methods of highlighting of non-permanent elements of structure.		2	2
4.	Morphology and ultrastructure of actinomycetes, spirochetes, rickettsii, chlamidia, mycoplasma, fungi.	1	2	3
5.	The influence of the environmental factors on m\o. Sterilization. Disinfection	2	2	2
6.	Physiology of bacteria. Bacterial metabolism. Enzymes. Nutrition. Bioenergetics. Culture media.	2	4	2
7.	Bacteriological method of diagnosis. Principles of cultivation and isolation of pure cultures of aerobic microorganisms.	2	2	2
8.	Bacteriological method of diagnosis. Principles of cultivation and isolation of pure cultures of anaerobic microorganisms.		2	2
9.	The relationships of microorganisms in an ecosystem. Microbiota of oral cavity. Antibiotics. Mechanisms of action of antibiotics. Mechanisms of resistance of microorganisms to antibiotics. Bacteriocins.	2	2	2
10.	Bacteriophages. Genetics of microorganisms.		2	2
11.	Infectious process. Non- specific host defence. Biological method of diagnostic.	2	2	4
12.	Immunity. Immune response. Antigens and antibodies.	2	2	4
13.	Immunological diagnostic method. Antigen-antibody reactions.		4	3
14.	Hypersensitivity. Hypersensitivity reactions. The practical importance of allergical phenomena (reactions) for dentists and physicians. Allergens. Allergical method of diagnostic.	1	2	3
15.	Immunoprophylaxis and immunotherapy of infectious diseases		2	4
Total		**17**	**34**	**39**

VI. REFERENCE OBJECTIVES OF CONTENT UNITS

Objectives	Content units
Theme (chapter) 1. The basis of morphology and physiology of microorganisms.	
• To know the main morphological forms of microorganisms. • To know nomenclature and the taxonomy of microorganisms. • To know the essential and nonessential elements of microbial cell structure. • To show techniques for studying ultrastructure of microorganisms. • To know and to apply microscopy techniques. • To define the notions of sterilization, disinfection, aseptic and antiseptic. • To know the groups of culture media. • To develop own options regarding the physiological role of microorganisms.	Microbial cell - essential and nonessential structural elements of bacterial cell. Morphology and ultrastructure - Methods of study. Microscopy techniques. Action of environmental factors on the microbial cell. Methods of sterilization and disinfection. Mediile de cultură – aplicarea practică. Microbial metabolism. Resistance of microorganisms to antibiotics and methods of study.
Theme (chapter) 2. Infection and immunity.	
• To define define the notion of infection, infectious process and infectious disease. • To know the dynamics of the infectious process. • To know the virulence factors of pathogenicity of microorganisms. • To know the role and particularities of specific and non-specific immunity. • To show different immunoprophylaxis and specific immunotherapy algorithms.	Non-specific resistance - physical barriers, humoral and cellular factors. Non-specific defense mechanisms: • First line of defense - skin, mucous membranes, organ barriers; • Second line of defense - cellular factors; humoral factors Specific resistance - humoral immunity, cellular immunity. Specific innate resistance. Specific artificial resistance(immunity). Immune response. Humoral immunity. Antigens. Antibodies. Structure of antibodies. The classes of immunoglobulins. Elaboration of humoral immune response - Antibody genesis. Stages of development humoral immune response. Dynamics, intensity and quality humoral immune response. Primary, secondary and tertiary humoral immune response. Practical applications of the Antigen-Antibody reaction. Elaboration of cellular immune response- dynamics of cellular immune response: primary cellular response, immunological memory. Immunosuppression. Immunological tolerance. Autoimmunity. Hypersensitivity.

VII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES

✓ **Professional (specific) (SC) competences**

- PC1. Use of basic knowledge and application of principles and methods for solving well-defined situation problems, typical of the field of microbiology;
- PC2. Application of knowledge about the classification of microorganisms and their place in the living world and their application in the theory of microbial cell structure, chemical composition and nutrition requirements of the main groups of micro-organisms.
- PC3. Application of knowledge about the cultivation and growth of microorganisms, about the action of external factors on the vital activity of microorganisms.
- PC4. Using of knowledge about the principles of immunoprophylaxis and immunotherapy of infectious diseases.

✓ **Transversal competences (TC)**

- TC1. Identifying the need for professional training, with critical analysis of its own training activity and the level of professional development and efficient use of communication and training resources(Internet, e-mail, databases, on-line courses, etc.), including using foreign languages;

✓ **Study outcomes**

At the end of the course the student will be able to:

- To posess skills of respectation the rules of the antiepidemic regime of aseptic, antiseptic, disinfection and safety techniques in the microbiology lab;
- To possess skills for completing the template for samples to be analyzed;
- To perform physical and chemical decontamination of infected materials, processing of infected rooms, objects, equipment and hands, inactivation of microbial cultures;
- To be able to prepare smear from pure culture of microorganisms and specimens(samples).

VIII. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Work with information sources:	Reading the lecture or the material from the manual for the topic carefully. Read questions from the topic, which require a reflection on the subject. To be familiarized? with the list of additional information sources on the topic. Select the source of additional information for that theme. Reading the text entirely, carefully and writing the essential of content. Formulation of generalizations and conclusions regarding the importance of the subject.	Ability to extract the essentials; interpretative skills; the volume of work	During the semester
2.	The work with the practical workbook:	Until solving the tasks in the notebook to analyze the information and images from the respective subject in the lecture and book. Solving the student's individual training tasks. Formulation of conclusions at the end of each laboratory.Verify the end of results and evaluation their achievement.	Workload, solving of problems, ability to formulate conclusions.	The end of semester

IX. METHODOLOGICAL SUGGESTIONS FOR TEACHING – LEARNING - ASSESSMENT

- ***Teaching and learning methods used***
  Exposing, interactive lecture, heuristic conversation, brainstorming, group work, individual study, work with manual and scientific text, debate, solving of exercises, interactive listening.
- ***Applied teaching strategies / technologies*** *(specific to the discipline)*
- **Observation -** Identification of elements characteristic of the microbial cell, description of the structure elements of the microbial cell (permanent and non-permanent elements).
- **Analysis -** Imaginary decomposition of the whole into component parts. Highlighting of the essential elements. Studying of each element as part of the whole.
- **Analysis of scheme/ figure -** Selection of necessary information. Recognition based on the knowledge and information selected from the structures shown in the scheme, image. Analysis of the functions / role of recognized structures.
- **Comparison -** Analysis of the first object / process from a group and determination of its essential features. Analysis of the second object / process and the establishment of its essential features. Comparison of objects / processes and highlighting of common features. Comparison of objects / processes and determination of differences. Establish of criteria for differentiation. Formulation of conclusions.
- **Classification-** Identification of structures / processes that have to be classified. Determination the fundamental criteria on which classification is made. Distribution of structures / processes by groups according to established criteria.
- **Elaboration the scheme-** Selection of elements, which must be in the schema. Interpretation of the elements selected by different symbols / colors and indication of relationships between them. Interpretation of an appropriate title and legend of the symbols used.
- **Modeling-** Identification and selection the elements needed to model the phenomenon. Description (graphical, schematic) of the phenomenon studied. Achieving the phenomenon using the developed model. Formulation of conclusions, deduced from arguments or findings.
- **Experiment-** Formulation of a hypothesis, starting from known facts, about the studied process / phenomenon. Verifying the hypothesis by performing the processes / phenomena studied under laboratory conditions. Formulation of conclusions, deduced from arguments or findings.
- ***Methods of assessment*** *(including the method of final mark calculation)*

Current: frontal and / or individual control through
(a) the application of docimological tests,
(b) control questions
(c) evaluation of the workload of individual tasks
Final*:* colloquy

The final grade will consist of the average score of 2 control tests and the grade from the individual work assessment (share 0.5).

Method of mark rounding at different assessment stages

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS Equivalent
1,00-3,00	**2**	**F**
3,01-4,99	**4**	**FX**
5,00	**5**	**E**
5,01-5,50	**5,5**	
5,51-6,0	**6**	
6,01-6,50	**6,5**	**D**
6,51-7,00	**7**	
7,01-7,50	**7,5**	**C**
7,51-8,00	**8**	
8,01-8,50	**8,5**	**B**
8,51-8,00	**9**	
9,01-9,50	**9,5**	**A**
9,51-10,0	**10**	

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student's record-book.

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations.

X. RECOMMENDED LITERATURE:

A. Compulsory:

1. R. Ananthanarayan, C. Jayaram Paniker. Textbook of Microbiology. Orient Longman, 2005.
2. Jawetz, Melnick, & Adelberg's. Medical Microbiology. Twenty-Second Edition, 2001.
3. W. Levinson. Review of Medical Microbiology and Immunology, tenth edition. Mc Graw Hill LANGE, 2008.

B. Additional

1. J.G. Cappuccino. N. Sherman. Microbiology a laboratory manual, 7th edition. Pearson Edication, 2005.