COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Fundamentals of Microbiology. Oral Ecosystem.	**MIKRB 3115**

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: Prof. Dr. Tomas Kačergius **Other(s):**	Department of Physiology, Biochemistry, Microbiology and Laboratory Medicine, Institute of Biomedical Sciences, Faculty of Medicine, Vilnius University, M. K. Čiurlionio str. 21, LT-03101 Vilnius, Lithuania

Study cycle	Type of the course unit (module)
Integrated studies (I and II levels)	Compulsory

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Face-to-face (lectures and seminars; laboratory works in microbiology laboratory)	2nd semester	Lithuanian, English

Requirements for students	
Prerequisites: A student must have completed the following courses: fundamentals of human biology and genetics in odontology; human anatomy; human histology; biochemistry; human physiology.	**Additional requirements (if any):** None

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5 credits	134 hours	67	67

Purpose of the course unit (module): programme competences to be developed
To learn classification, morphology, structure, physiology and genetics of the microorganisms; to understand the interactions between microorganisms and human, contribution of pathogenic microorganisms to the pathogenesis of infectious disease, human immunity and characteristics of the immune response to pathogenic microorganisms during the infectious process; to learn immunological assays and methods used in microbiological diagnostics of infectious diseases; to know the prophylactic measures for infectious diseases; to know the most important characteristics of oral microorganisms and the causative agents of cross-infections in dental practice, pathogenesis of diseases caused by them, immunity, principles of the microbiological diagnostics and prophylaxis; to gain the basic research concepts in solving problems that occur during dental practice, and that are related to the interaction between microorganisms and human.

Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
Generic competences After successful completion of the course unit (module), student will be able:		
To act honestly and follow ethical obligations; to apply the principles of good dental practice in the work; to be emphatic; to be capable for thinking critically and self-critically; to be creative and initiative, to know how to pursue the purpose; to be capable for communicating with others.	Lectures, seminars and laboratory works.	Assessment of the tasks and self-study work.
To estimate the limits of self-competences and seek for help if necessary; to act under the new circumstances and adapt yourself according to them; to act independently; to solve problems and make decisions; to	Lectures, seminars and laboratory works.	Assessment of the tasks and self-study work.

communicate and work in the team along with specialists of other fields as well as other scientific experts; to be capable for organizing and planning.		
To analyze and synthesize; to learn during the further studies and learn independently during the lifetime; to be capable for application of the knowledge in the practice; to be capable for teaching others; to be capable for carrying out the scientific investigations.	Lectures, seminars and laboratory works.	Assessment of the tasks and self-study work.
To perceive environmental variety and multiculturalism; to understand and respect the customs of other cultures; to work in the international environment and communicate using other foreign languages; to be capable for seeking knowledge not only in the dentistry but also in other fields of general sciences.	Lectures, seminars and laboratory works.	Assessment of the tasks and self-study work.
Subject specific competences After successful completion of the course unit (module), student will be able:		
To select, analyze and systemize microbiology literature as well as scientific publications in the field of microbiology.	Lectures, seminars and laboratory works as well as self-study using library and internet resources.	Continuous assessment of the laboratory works and oral quizzes during seminars. Evaluation of the written quizzes. At the end of course unit – exam in the written form.
To understand the interactions between microorganisms and human, contribution of microorganisms to the pathogenesis of infectious disease, characteristics of the immune response to pathogenic microorganisms.	Lectures, seminars and laboratory works as well as self-study using library and internet resources.	Continuous assessment of the laboratory works and oral quizzes during seminars. Evaluation of the written quizzes. At the end of course unit – exam in the written form.
To understand and know the methodology of microbiological investigation – to make the plan of microbiological investigation, choose correctly and implement microbiological and immunological methods of the investigation.	Lectures, seminars and laboratory works as well as self-study using library and internet resources.	Continuous assessment of the laboratory works and oral quizzes during seminars. Evaluation of the written quizzes. At the end of course unit – exam in the written form.
To understand the oral ecosystem and know the most important characteristics of oral microorganisms, pathogenesis of diseases caused by them, immunity, principles of the microbiological diagnostics and prophylaxis.	Lectures, seminars and self-study using library and internet resources.	Oral quizzes during seminars. Evaluation of the written quizzes. At the end of course unit – exam in the written form.
To understand and know the most important characteristics of the causative agents of cross-infections in dental practice, their routes of transmission as well as know how to select correctly the appropriate measures of their control.	Lectures, seminars and self-study using library and internet resources.	Oral quizzes during seminars. Evaluation of the written quizzes. At the end of course unit – exam in the written form.

Content: breakdown of the topics	**Contact hours**							**Self-study work: time and assignments**	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	**Contact hours**	**Self-study hours**	**Assignments**
1. Microbiology objects and tasks. History of microbiology.	2		1				**3**	**4**	To be prepared for the seminar about microbiology objects and tasks; history of microbiology development in the world.
2. Classification and nomenclature of micro-organisms. Morphology and structure of microorganisms.	4		3		3		**10**	**9**	To be prepared for the seminars and laboratory works about the classification and nomenclature of microorganisms; morphology, structure, differences of the various microorganisms' groups and their

									examination methods.
3. Physiology of micro-organisms. Nutrition of microorganisms. Metabolism, energy production and reproduction of bacteria. Cultivation of aerobic and anaerobic bacteria.	4		4		4		**12**	**10**	To be prepared for the seminars and laboratory works about the physiology of microorganisms; nutrition of micro-organisms; metabolism, energy production and reproduction of bacteria; culture media; principles of cultivation and isolation of pure cultures of the aerobic and anaerobic bacteria.
4. Human normal microbiota. Ecology of microorganisms. Effect of the environmental factors on microorganisms.	2		1		1		**4**	**4**	To be prepared for the seminar and laboratory work about the human normal microbiota, dysbiosis and its causative factors; ecology of microorganisms; effect of the environmental factors (physical, chemical, biological) on microorganisms.
5. Genetics of microorganisms. The mechanisms of antimicrobial resistance.	2		1		1		**4**	**4**	To be prepared for the seminar and laboratory work about the organization of genome and types of genetic variability of microorganisms; the main groups of antimicrobial agents and mechanisms of antimicrobial resistance.
6. The infectious process. The role of microorganisms and human in the infectious process.	2		1		1		**4**	**4**	To be prepared for the seminar and laboratory work about the interaction between microorganisms and human; microbial virulence factors and their role in the infectious process.
7. Human immunity, its types and immune system. Factors of human innate and acquired immunity. Mechanisms of the immune response to infectious agents. Development of allergies caused by infections. Immunological assays and methods used in micro-biological diagnostics of infectious diseases. Prophylactic measures for infectious diseases.	6		4		4		**14**	**10**	To be prepared for the seminars and laboratory works about human immunity, its types and immune system; factors of human innate and acquired immunity as well as their functions; mechanisms of the immune response to infectious agents; development of allergies caused by infections; immunological assays and methods used in microbiological diagnostics of infectious diseases; measures of the nonspecific and specific prophylaxis for infectious diseases.
8. Morphology and structure of viruses. Replication of viruses. Examination and cultivation methods of viruses.	2		2		2		**6**	**6**	To be prepared for the seminars and laboratory works about the morphology, structure, replication, examination and cultivation methods viruses.
9. Human oral ecosystem. Microorganisms causing oral diseases and their characteristics. Pathogenesis, immunity, microbiological diagnostics and prophylaxis of dental caries and periodontal diseases. Dental bacterial biofilm and its implication in the development of oral diseases.	6		1				**7**	**10**	To be prepared for the seminar about the human oral ecosystem; microorganisms causing oral diseases and their characteristics; pathogenesis, immunity, microbiological diagnostics and prophylaxis of dental caries and periodontal diseases; dental bacterial biofilm, its causative factors and stages of formation as well as influence on the development of dental caries and periodontal diseases.
10. Causative agents of cross-infections in dental practice, their characteristics, diseases caused by them and pathogenesis, immunity, microbiological diagnostics, prophylaxis and control.	2		1				**3**	**6**	To be prepared for the seminar about the causative agents of cross-infections in dental practice, their characteristics, diseases caused by them and pathogenesis, immunity, microbiological diagnostics, nonspecific and specific prophylaxis as well as control measures.
Total	**32**		**19**		**16**		**67**	**67**	

Assessment strategy	Weight, (%)	Deadline	Assessment criteria
Quizzes	10%	During semester	There are three written quizzes in spring semester, during which the student reports for the defined sections of the course unit "Fundamentals of Microbiology. Oral Ecosystem" in written form. The quizzes consist of the closed and/or opened type questions. The written quizzes are evaluated using grades in the scale of ten-point system, and they are recognized as positive, when the obtained grades are in the scale from 5 to 10 points.
Final exam	90%	During session	The final exam of the course unit "Fundamentals of Microbiology. Oral Ecosystem" consists of: 10% – practical task; 80% – written answers to the closed and/or opened type questions, covering whole information provided in lectures, seminars and laboratory works of the course unit "Fundamentals of Microbiology. Oral Ecosystem". During the practical task, the medical microbiology practical knowledge and skills are evaluated by giving the answers to opened type questions in oral form, including fullness, consistency and correctness of each answer. The final exam is evaluated using grades in the scale of ten-point system, and it is considered to be passed positively, when the obtained grade is in the scale from 5 to 10 points. The final cumulative grade consists of: 90% – positive grades of the final exam; 10% – positive grades obtained from the written quizzes during spring semester. The meaning of grades of the ten-point system: 10 (excellent) – excellent performance, outstanding knowledge and skills; 9 (very good) – strong performance, good knowledge and skills; 8 (good) – above the average performance, knowledge and skills; 7 (highly satisfactory) – average performance, knowledge and skills with unessential shortcomings; 6 (satisfactory) – below average performance, knowledge and skills with substantial shortcomings; 5 (sufficient) – knowledge and skills meet minimum criteria; 4, 3, 2, 1 (insufficient) – knowledge and skills do not meet minimum criteria/below minimus criteria.

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsory reading				
R. J. Lamont, G. N. Hajishengallis, H. F. Jenkinson	2014	Oral Microbiology and Immunology	2nd edition	Washington DC, ASM Press
P. R. Murray, K. S. Rosenthal, M. A. Phaller	2020	Medical Microbiology	9th edition	Philadelphia, Elsevier Inc.
J. G. Black, L. J. Black	2017	Microbiology: principles and Explorations	10th edition	New Jersey, Willey
Optional reading				
A. K. Abbas, A. H. Lichtman, S. Pillai	2017	Cellular and Molecular Immunology	9th edition	Philadelphia, Saunders/ Elsevier Inc.
K. C. Carroll, J. A. Hobden, S. Miller, S. A. Morse, T. A. Mietzner, B. Detrick, T. G. Mitchell, J. H. McKerrow, J. A. Sakanari	2016	Jawetz, Melnick, & Adelberg's Medical Microbiology	27th edition	New York, McGraw-Hill Education, AccessMedicine: http://accessmedicine.mhmedical.com/content.aspx?bookid=1551&sectionid=94104942