

COURSE UNIT DESCRIPTION - IMMUNOLOGY

Course unit title	Code
IMMUNOLOGY	

Lecturer(s)	Department(s)
Coordinator: Assoc. Prof. Ingrida Pumputiene Other(s):	Vilnius University, Department of Microbiology and Biotechnology, M.K.Čiurlionio g. 21/27, LT-03101 Vilnius

Cycle	Level of the course unit	Type of the course unit
Full-time studies (1 st stage)	1 out of 1	Compulsory

Mode of delivery	Period of delivered	Language(s) of instruction
Face to face	7 th semester, autumn	Lithuanian

Prerequisites and corequisites	
Prerequisites: None	Corequisites (if any): None

Number of credits allocated to the course unit	Student's total workload	Contact hours	Self-study and research hours
5	134	64	70

Purpose of the course unit: programme competences to be developed		
The course unit aims to develop: <i>Subject-specific competences:</i> <ul style="list-style-type: none"> knowledge and skills necessary to understand the structure and functions of the immune system, cellular-molecular mechanisms and their disorders, principles of basic immunology methods practical laboratory skills in basic physiology; skills to apply theoretical knowledge in laboratory and scientific practice. <i>General competences:</i> <ul style="list-style-type: none"> analytical and critical thinking skills for self-development, learning skills in order to study general science resources; 		
Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
The student will gain knowledge about structure of the immune system, will be able to understand cellular and molecular mechanisms of the immune system.	Problem-based teaching lecture, discussion in seminars, self-study of the literature.	Test, presentation, examination
Will understand relationship between immune system and other organism systems (neural-endocrine) and importance of this relationship.	Problem-based teaching lecture, discussion in seminars, self-study of the literature.	Test, presentation.
Will gain knowledge about defects of the immune system, will understand the basis of immunopathologies and will be able to evaluate the consequences of immunological changes.	Problem-based teaching lecture, view of scientific-information video clips and animations, discussion in seminars, preparation of presentation.	Test, presentation, examination
Will understand the principles of basic immunological tests, applicability of them in laboratory research and clinical diagnostics.	Problem-based teaching lecture, dealing with a situation, discussion in seminars, preparation of presentation.	Test, presentation, examination
Will increase their creative and innovative	Discussion in seminars,	Test, presentation, examination

potential, the ability to communicate, work as a team and manage it, to motivate members of the public to achieve common goals.	preparation of presentation.	
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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. Types of immunity Function of the immune system. Components of the innate immunity. Characteristics of acquired immunity. Humoral and cellular immunity. Relationship between innate and acquired immunity. Active and passive immunity, natural immunity.	4						4	2	Study of the scientific papers. Self-directed learning of the topic-related textbook material
2. Organs of the immune system Organization of the immune system: organs, cells, molecules. The structure and functions of primary immune system organs (bone marrow, thymus). Secondary immune system organs (spleen, lymph nodes, mucosal lymphoid tissue and skin immune system) and their functions. Embryogenesis of the immune system. Evolution of the immune system. Relationship between immune system and other organ systems.	4		2				6	8	Study of the scientific papers. Preparation for discussion and presentation.
3. Cells of the immune system. Cells (lymphocytes, mononuclear cells, dendritic cells, neutrophils, eosinophils, basophils) participating in the immune response: structure and function. Hematopoiesis and cells of the immune system.	4						4	2	Study of the scientific literature.
4. Lymphocytes – major cells of specific immune response. B cell maturation, clusters of differentiation (CDs). B lymphocyte populations and their functions. T cell maturation, CDs. T cell populations, subpopulations and their properties. The biologic role of positive and negative B cell and T cell selection. NK cells maturation, surface markers and functions. NKT cell properties.	6						6	4	Study of topic-related textbook material. Analysis of test mistakes.
5. Antigens. Concept of the antigenicity and immunogenicity. A definition of antigen and immunogen. Properties of antigen that determine the immunogenicity. Types of antigens: haptens, superantigens, thymus-independent antigens, autoantigens. Red cell antigens – the basis of blood group classification. Antigen determinants-epitopes, types of epitopes.	4		2				6	6	Study of the scientific literature. Preparation for discussion and presentation.
6. Antibodies and their properties. Antibodies – immunoglobulins (Ig). Basic structure of immunoglobulin (Ig) molecule, function of Ig molecule fragments. A paratope structure. Characteristics of Ig classes (IgM, IgG, IgA, IgD, IgE) and subclasses Ig, Isotypic, allotypic, idiotypic antigen determinants. Genetic basis of the diversity of anti-	6						6	8	Study of the scientific literature. Preparation for discussion in seminar.

body specificity. Variety of Ab (polyclonal, monoclonal, labelled, catalytic, natural, recombinant antibodies, autoantibodies), their functions and production.									
7. Antigen-antibody (Ag-Ab) interaction. Major immunological methods. Characteristics of Ag-Ab interaction. Affinity and avidity, specificity, cross-reactivity and their result. Ag-Ab interactions – basis of immunological methods: protocols and application of major immunological methods (immunodiffusion and agglutination reactions, immunoelectrophoresis, immunoblotting, radioimmunoassay, enzyme-linked immunosorbent assay, immunofluorescence, FACS, MACS).	4		6				10	8	Study of the scientific papers. Preparation for discussion and situation analysis in seminars.
8. Molecules of the immune system. Structure and function of B cell receptor (BCR). T cell receptor (TCR) structure and function. Major histocompatibility complex (MHC), participation in Ag presentation and role in organ transplantation. Cytokines – mediators of immune system. Properties of chemokines. Adhesion molecules and their role in cell communication and trafficking (steps of extravasation). Complement system composition and ways of activation.	8						8	8	Study of the scientific literature. Analysis of test mistakes.
9. Immune response. Components of the immune response. Pathways of antigen processing and presentation: exogenous (MHC I), endogenous (MHC II), CD1 and superantigens. Infectious immunity, immune memory. Immunology of transplant rejection. Tumor immunity.	4		2				6	6	Study of the scientific literature.
10. Defects of the immune response. Immunopathologies – result of the immune response defects. Defects of immune response in immune-deficiencies, autoimmunity and hypersensitive reactions. Age-dependent changes of the immune system. Factors influencing the immune system.	4		4				8	8	Study of the scientific literature. Preparation for discussion and presentation.
Examination								10	Preparation for the exam.
Total	48		16				64	70	

Assessment strategy	Weight, %	Assessment period	Assessment criteria
Test Nr.1 Test Nr.2	30	7 th week of the course 14 th week of the course	Each test consists of 30 questions evaluated by points. The maximum amount of test points – 50. The second test could only be written if the result of the first test is at least 16 points. Questions require optional choice or a short answer. The points that are scored in both of the tests are added up (the maximum amount of points – 100). Assessment criteria: 3: 85-100 points, 2: 51-84 points, 1: 16-50 points, 0: 0-15 points.
Oral presentation (presentation in seminar)	20	September-December	Assessment criteria: 2: the topic is analyzed in detail. The structure of presentation is logical. Opinion of the student on the analyzed topic is reasonable, shows his erudition on the subject. A good visual presentation.

			1: incomplete analysis of the topic, poor structure of presentation, visual presentation is satisfactory. 0: the presentation was not prepared or the topic was analyzed not properly.
Examination (written)	50	January	Exam (written) is allowed only in case of the positive assessments of 2 tests (2 points) and oral presentation (1 point). A student receives an exam paper with 2 questions, which must be answered in written form. Assessment criteria: completeness of the answer, consistency and correctness of information. Assessment by scores. Scoring values: 10 (5 points): Excellent knowledge and skills. 9 (4,5 points): Very good knowledge and skills. 8 (4 points): Good knowledge and skills with minor errors. 7 (3,5 points): Moderate knowledge and skills with small errors. 6 (3 points): Satisfactory knowledge and skills with errors. 5 (2,5 points): Poor knowledge and skills that have not satisfied the minimum requirements. There are a lot of mistakes. 0-4 (0-2 points): The minimum requirements are not fulfilled.
Final assessment	100		The final assessment consists of the tests, presentation and examination point score.

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsory reading				
Tamošiūnas V.A., Pumputienė I., Kvietkauskaitė R.	2013	Imunologijos ir imunotecnologijos pagrindai		Vytauto Didžiojo universiteto leidykla (in press)
Abbas A.K. Lichtman A.H, Pillai S.	2012	Cellular and Molecular Immunology: with STUDENT CONSULT Online Access	7th ed.	Philadelphia: Elsevier Saunders.
Girkontaitė I., Kvietkauskaitė R., Valčekienė V., Gerasimčik N.	2008	Imunotecnologija (metodinė knyga)		UAB "Greita spauda"
Optional reading				
Tamošiūnas V.A., Dubakienė R., Žvirblienė A.	2013	Aiškinamasis imunologijos ir alergologijos terminų žodynas		Mokslo ir enciklopedijų leidybos centras
Sompayrac L.M.	2012	How the Immune System Works (Includes Free Desktop Edition)		USA: Wiley-Blackwell Publishing
Delves P.J., Martin S.J., Burton D.R., Roitt I.M.	2011	Roitt's Essential Immunology	12th ed.	USA: Wiley-Blackwell Publishing
Kindt T.J., Osborne B.A., Goldsby R.A.	2007	Kuby Immunology	6th Edition	W.H.Freeman and Company, USA www.whfreeman.com/kuby www.whfreeman.com/immunology6e