

GENERAL INFORMATION		
Course name	Immunology	
Course director	Assoc. Prof. Martina Mihalj, MD, PhD	
Assistants	Prof. Tímea Berki, MD, PhD Prof. Ferenc Boldizsár, MD, PhD Prof. Péter Engelmann, MD, PhD Prof. Ines Drenjančević, MD, PhD Asst. Prof. Zrinka Mihaljević, PhD Zoltán Kellermayer, MD, PhD Ivana Krajina, MD.	
Study program	Integrated undergraduate and graduate university study program Medical Studies in German	
Course status	Mandatory	
Year, semester	2 nd year, 4 th semester	
Credits allocated and form of instruction	ECTS student workload	5
	Number of teaching hours (L+S+E)	65 (25+20+20)
COURSE DESCRIPTION		
Course objectives		
The objective of the course is for students to learn the physiological course and regulation of the immune response, as well as effector mechanisms, immune tolerance and immune response to neoplasms.		
Course requirements		
Completed courses: Medical biochemistry, Anatomy, Medical biology		
Learning outcomes relevant to the study program		
1.1., 2.1., 3.5., 4.2.		
Expected learning outcomes		
Knowledge		
<ol style="list-style-type: none"> List and describe the molecular, cellular and tissue structure of the immune system as well as the mechanisms of primary maturation and selection of clones of immune cells List and describe the mechanisms of antigen recognition (molecules, microorganisms, cells, tissues and organs) Describe specific and non-specific mechanisms of immunoreaction and immunoregulatory mechanisms of stimulation and suppression of the immune response List and describe the humoral and cellular executive mechanisms of the immune response Fully interpret the integrative and homeostatic role of the immune system in the body List and describe the consequences of an excessive or insufficient immune response and diseases that arise as a result of an immunopathophysiological process (autoimmune diseases, hypersensitivity reactions, immune deficiency) Describe the principles of transplant immunology List and describe the possibilities of affecting the immune response (vaccination, immunostimulation and immunosuppression) 		

Skills

1. Isolate lymphocytes from the peripheral blood suspension and separate lymphocyte subtypes based on the expression of differentiation markers
2. Independently perform the lymphocyte lysis test and interpret the results obtained

Course content

1. (L) Introduction to immunology. Structure of the immune system: organs, tissues, cells.
2. (L) Development and functions of the immune system cells. Definition of antigen. Immune recognition molecules: antibodies, B-cell and T-cell receptors.
3. (S) Structure of lymphatic organs, immune system cells, CD markers.
4. (L) MHC molecules – antigen presentation.
5. (S) Innate immunity: inflammation, leukocyte migration.
6. (L) Cytokines and their receptors.
7. (L) Immunoglobulin genetics, organization and expression of antigen receptor genes. Innate immunity.
8. (S) Differentiation and development of B and T cells.
9. (L) The first step of the specific immune response. Activation of T cells, signal transmission pathways. Polarization of T cells. Lymphocyte recirculation, adoption.
10. (L) Humoral immune response.
11. (S) Humoral effector mechanisms mediated by immunoglobulins.
12. (L) Complement system.
13. (L) Development of immunological memory: comparison of primary and secondary immune responses.
14. (S) Effector mechanisms of cell-mediated immunity. Cytotoxicity.
15. (L) Immune systems of skin and mucous membranes (MALT and SALT). Regulation of the immune response, immunosuppression.
16. (L) Allergies and hypersensitivity reactions.
17. (L) Tolerance and autoimmunity.
18. (S) Organ transplant. Tumor immunology.
19. (L) Inherited and acquired immunodeficiencies.
20. (S) Vaccines and immunotherapy.
21. (E) Monoclonal and polyclonal antibodies. Hybridoma technology. Application in diagnostics and research.
22. (E) Immunohistochemistry, fluorescence microscopy. Structure of lymphatic organs.
23. (E) Flow cytometry. Cell separation method.
24. (E) Methods of determining autoantibodies, clinical application.
25. (E) Immune response against pathogens.

L – lecture, S – seminar, E – exercise

Form of instruction

- lectures
seminars and workshops
exercises
distance learning
field course

- individual assignments
multimedia and Internet
laboratory
mentoring activities
other

Student obligations

Attending lectures, seminars and exercises. Exercises: taking the entry exams, keeping a work log, writing a paper, taking the final exam. Seminars are conducted in the form of a focused discussion. Therefore, students should prepare for the seminar in advance. Taking a partial and final written exam as well as an oral exam.

Monitoring student learning							
Attendance	x	Active participation	x	Seminar paper		Experimental work	x
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment		Paper		Practical work	x
Portfolio							
Assessment and evaluation of students during class and on the final exam							
<p>During classes, students' knowledge is assessed by taking partial exams and exams related to the preparation of exercises as well as by the preparation of seminar papers that the students present in the form of presentations. By fulfilling all the stipulated obligations at seminars and exercises, students acquire the right to take the written and oral part of the exam. By taking partial exams with a result of more than 40%, students acquire the right to take the oral part of the exam without having to take the written part of the exam.</p> <p><i>Formulation of the final grade</i> Points achieved in class are combined with points achieved on the final exam. The grading in the ECTS system shall be carried out by using absolute distribution, i.e. shall be based on the final achievement and compared to the numerical system as follows: A – excellent (5): 90-100 points; B – very good (4): 80-89.99 points; C – good (3): 65-79.99 points; D – sufficient (2): 50-64.99 points.</p>							
Mandatory reading							
1. Janeway Immunologie, 2018, Springer Stephan Gadola: Einführung in die klinische Immunologie, 2018, Urban & Fischer Verlag/Elsevier GmbH							
Additional reading							
1. Abbas: Cellular and Molecular Immunology, 9th edition 2017, Saunders W.B							
The number of copies of mandatory reading in proportion to the number of students currently taking this course							
<i>Title</i>				<i>Number of copies</i>		<i>Number of students</i>	
Janeway Immunologie, 2018, Springer Stephan Gadola: Einführung in die klinische Immunologie, 2018, Urban & Fischer Verlag/Elsevier GmbH				A purchased license for online textbooks shall be used. Access will be granted to all students enrolled in the study program			
Quality monitoring methods ensuring the acquisition of knowledge upon completion, skills and competences							
An anonymous, quantitative, standardized student survey on the quality of the organization and conduction of classes, the course content and the work of professors conducted by the Quality Assurance Office of the Faculty of Medicine Osijek and a unified university student survey conducted by the Quality Assurance Center of the Josip Juraj Strossmayer University of Osijek.							