(Table 5.2) Course unit description

Study program: Master of Academic Studies in Molecular Biology and Physiology
Type and level of studies: Master of Academic Studies
Course unit: Molecular Immunobiology
Teacher in charge: Miloš M. Matić
Language of instruction: English
ECTS: 6
Prerequisites:
Semester: summer semester
Course unit objective Elucidation of the mechanisms underlying immunobiological reactions and understanding of their regulatory aspects. Investigation of the role of the immune response in the development of various pathophysiological conditions, as well as the molecular basis of immune system disorders. Examination of the use of diagnostic parameters in immunobiological analyses.
Learning outcomes of Course unit Upon completion of the course, students will be able to understand the molecular basis of immunobiological reactions and their regulation, as well as the molecular mechanisms underlying the pathogenesis of various disorders of the immune response. Students should develop the ability to assess and predict specific mechanisms of immune responses to pathogens and tumors and acquire proficiency in applying fundamental molecular methods for the analysis of immune cells, molecules, and signaling pathways. They should also be able to understand the importance of molecular biology techniques in the diagnosis and monitoring of treatment of immunobiological disorders, design strategies for the development of immunotherapies, critically review and interpret scientific literature, formulate scientific hypotheses, and acquire the skills necessary to participate in scientific research.
Course unit contents *Theoretical classes:* Types of immune system cells. Differentiation of hematopoietic lineages. Development, differentiation, and maturation of B lymphocytes. Development, differentiation, and maturation of T lymphocytes. Types of immune receptors. Antigen processing and presentation. Molecular mechanisms of cellular and humoral immune responses. Mechanisms of immunological tolerance. Principles of immunotherapy. Inflammatory responses. Mechanisms of autoimmunity. Transplantation immunology. Primary and secondary immunodeficiencies. Lymphoproliferative disorders. Types and functions of cytokines. Tumor immunobiology. Viral immunobiology. *Practical classes:* Practical Classes, Other Forms of Teaching, and Individual Research Work: Maintenance and propagation of immune and tumor cell cultures. Measurement of nitric oxide (NO) production in *in vitro* immune cell cultures. Determination of cytokine production in immune cell cultures. Application of molecular biology techniques in immunological analyses (immunoblotting, PCR, qRT-PCR, ELISA). Research models of inflammatory, tumor, and autoimmune diseases. Principles of monoclonal antibody production and their applications in research and diagnostics. Preparation of seminar papers, computer simulations, and experimental analyses.
Literature Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai, Sarah Henrickson. Cellular and Molecular Immunology 11th edition ,2025. Kenneth M. Murphy, Casey Weaver, Leslie J. Berg . Janeway's Immunobiology 10th edition · 2022
Number of active teaching hours | Other classes:

Lectures: 2	Practice: 2	Other forms of classes:	Independent work:	

Teaching methods

Lectures, laboratory classes, computer simulations, consultations, preparation and presentation of seminar papers.

Examination methods (maximum 100 points)

Exam prerequisites	No. of points	Final exam	No. of points
Practical classes	5	Written examination	20
Tests	10	Oral examination	50
Homework	5	Other	
Seminars	10		
Project			

Grading system

Grade	No. of points	Description
10	>= 91	Excellent
9	81-90	Exceptionally good
8	71-80	Very good
7	61-70	Good
6	51-60	Passing
5	<=50	Failing