

DISCIPLINE SHEET

Name of the discipline: Immunology

Course lecturer : Dr. Lorelei Irina Brasoveanu, Senior Researcher, CSI

Year of study 2023-2024

Number of hours per week/Verification/Credits		
Course	Form of examination	Credits
2 h	Examination	15

A. DISCIPLINE OBJECTIVES (Objectives are formulated in terms of professional competences):

The general objective of the discipline	<ul style="list-style-type: none"> •Acquisition of general, theoretical and practical knowledge regarding the immune system
Specific objectives:	<ul style="list-style-type: none"> • Description of the fundamental notions of cellular and humoral immunology • Understanding the cellular and molecular mechanisms involved in regulating the immune response • Description of techniques/methods to characterize normal and pathological immune status • Development of theoretical and experimental models used in immunology studies, analysis of experimental data and exploitation of results • Evaluation of some immunotherapeutic approaches in various pathologies

B. CONDITIONS (where applicable)

Course conditions	<ul style="list-style-type: none"> • Multimedia projector, video projector, laptop • Cell culture, flow cytometry, immunochemistry, biochemistry, molecular biology laboratories
-------------------	--

C. ACCUMULATED SPECIFIC COMPETENCES (Refers to the competences provided by the study program to which the subject belongs)

Professional skills	<ul style="list-style-type: none"> • Developing the ability to quickly understand and correctly evaluate some theoretical and practical information • Developing the skills to perform scientific projects, experimental reports and scientific papers • The ability to correctly analyze and critically interpret research results • The ability to identify alternative solutions and to demonstrate/support the relevance of these alternatives • Stimulating the use of the gained knowledge in interdisciplinary approaches to realize the proposed scientific projects
Transversal competences	<ul style="list-style-type: none"> • Developing the skills to work independently and in multidisciplinary teams • Oral and written communication skills • Respect and development of professional values and ethics

	<ul style="list-style-type: none"> • Adaptation to new technologies, professional and personal development, through continuous training, efficient use of information sources
--	--

A. CONTENT OF THE DISCIPLINE

a) Course

Chapter	Content	No (hours)
1. Basic knowledge in immunology	<ul style="list-style-type: none"> • Primary and secondary organs of the immune system, cells of the immune system (cells of the lymphoid series, antigen-presenting cells) • Antigens (Characterization and classification of antigens, immunogenicity) • Antibodies (Classification, structure and functions of immunoglobulins; antigen-antibody reactions) • Complement system (Activation pathways of complement, functions, regulatory molecules) 	4
2. The immune response	<ul style="list-style-type: none"> • Cellular immune response • Humoral immune response • The major histocompatibility complex (Types, structure, cellular distribution, processing and presentation of antigens) • Cellular hypersensitivity, tolerance and immunological memory 	4
3. Regulation of cell growth and proliferation	<ul style="list-style-type: none"> • Molecular mediators of the immune response (cytokines, chemokines): classification, mechanisms of action, properties, receptors • Apoptosis, necrosis, autophagy; regulatory factors involved • The cell cycle and regulatory factors involved 	4
4. Notions of immunopathology	<ul style="list-style-type: none"> • Immunodeficiency, autoimmune diseases • Immunology of transplantation 	2
5. Tumor immunology	<ul style="list-style-type: none"> • Carcinogenesis (Stages of the malignancy process, tumor stem cells, tumor biomarkers, the role of the tumor microenvironment) • The role of NK cells, T lymphocytes and macrophages in the antitumor immune response • Mechanisms of tumor escape from the host immune control • Immunotherapeutic approaches in cancer 	8
6. Laboratory techniques used in cellular and humoral immunology studies	<ul style="list-style-type: none"> • Cell culture techniques (preparation of culture media; separation of cell subpopulations from peripheral blood; processing and preservation of biological samples; cultivation of standardized cell lines; initiation of primary tumor cell cultures) • In vitro evaluation techniques of proliferation vs. cellular cytotoxicity (induced by chemical agents; NK, T cell-mediated; ADCC; complement dependent) by spectrophotometric, chemiluminometric approaches, real-time cellular analysis (RTCA) • Flow cytometry techniques (immunophenotyping, assessment of apoptosis, cell cycle phases, antigenic profile) • Immunochemical techniques (SDS-PAGE, Western blotting, Dot-blotting, immunoenzymatic methods) 	8
Total no of hours		30

E. EVALUATION (Specify the methods, forms of evaluation and their weighting in determining the final grade. Indicate the minimum performance standards, related to the competences defined in point A. **Objectives of the discipline**)

Activity Type	Assessment criteria	Evaluation methods	Weight of the final grade
Course	- The accuracy and quality of solving the exam subjects - Testing the knowledge acquired during the course	Check by: - Written exam	100%
The results are expressed by the following ratings: " <i>Very good</i> "; " <i>Good</i> "; " <i>Satisfactory</i> "; " <i>Unsatisfactory</i> ." The ratings " <i>Very good</i> ", " <i>Good</i> " and " <i>Satisfactory</i> " allow the PhD student to obtain the credits.			

F. METHODOLOGICAL BENCHMARKS

Lecture combined with dialogue. Use of modern means of training. Course support.

F. CORROBORATING THE CONTENTS OF THE DISCIPLINE WITH THE EXPECTATIONS OF THE REPRESENTATIVES OF THE EPISTEMIC COMMUNITY, REPRESENTATIVE PROFESSIONAL ASSOCIATIONS AND EMPLOYERS IN THE FIELD RELATED TO THE PROGRAM

- The discipline provides a wide fund of fundamental and practical knowledge regarding the characterization of cellular and humoral immunity, as well as the modulation of some immunological functions in various pathologies
- The discipline offers the doctoral student basic theoretical and practical elements that will contribute to the successful realization of the experimental part of the doctoral thesis in the field of biomedical sciences

G. BIBLIOGRAPHY

- 1) Grigore Mihaescu, Carmen Chifiriuc: "Immunology and Immunopathology", Editura Medicala, Bucuresti, 2021
- 2) Dorel Radu, Mircea Panait, Olga Simionescu, Cornel Ursaciuc, Eugen Radu, Mihail Hinescu: "Dictionary of Medical Immunology", Ed. Universitara "Carol Davila", Bucuresti, 2010 (under the coordination of Prof. Laurentiu Popescu)
- 3) Abul K. Abbas & Andrew H. Lichtman: "Cellular and Molecular Immunology", Vth ed., Ed.Saunders, Elsevier Science, 2003
- 4) Kenneth Murphy, Paul Travers, Mark Walport: "Janeway's Immunobiology", VIIth ed., Garland Science, Taylor&Francis Group, NY and London, 2008
- 5) John Mendelsohn, Joe W. Gray, Peter M. Howley, Mark A. Israel, Craig B. Thomson: "The Molecular Basis of Cancer", Ed. Elsevier Saunders, Philadelphia, SUA, 2015

6) Dorel L. Radu, Crina Stavaru, Iuliana Caras, Gina Manda, Monica Neagu, Eugen Radu, Cornel Ursaciuc, Laurentiu Popescu: "Methods and techniques of humoral and cellular immunology", Ed. Universitara "Carol Davila", Bucuresti, 2006

Course lecturer

Director of the Doctoral School

Dr. Lorelei Irina Brasoveanu, CSI

A handwritten signature in blue ink, appearing to read 'L. Brasoveanu', written in a cursive style.