II year (1st semester) **A.Y. 2021-22**	**Scientific Field**	**IMMUNOLOGY AND IMMUNOPATHOLOGY**	TUTOR	ECTS
	MED/04	Immunology and Immunopathology	Malisan Florence	5
	MED/04	Immunology and Immunopathology	Testi Roberto	1
	MED/04	Immunology and Immunopathology	Cotugno Nicola	1
MALISAN F. **COORDINATOR**			TOT	7

SPECIFIC AIMS	1) Knowledge of the mechanisms of immunological defense fundamentals with particular regard to the organization of the innate and adaptive immune system, to antigen recognition mechanisms, to the Major Histocompatibility Complex system, to the development and differentiation of B and T lymphocytes, and the activation of their effector functions. 2) Knowledge of the main immune mechanisms of pathogenetic relevance, in particular: the hypersensitivity reactions, the immunodeficiencies, the autoimmune disorders, transplantation and tumor immunology.

PROGRAM **IMMUNOLOGY**	General characteristics of the immune response. Innate immunity. Cells and tissues of the immune system. Leukocyte migration. Antibodies and repertoire diversity. Monoclonal antibodies. Complement. Major Histocompatibility Complex and Antigen presentation to T lymphocytes. T lymphocyte cell-mediated immunity.

TOPICS GENERAL CHARACTERISTICS OF THE IMMUNE RESPONSE	Immune system organization. Innate immunity and adaptive immunity: humoral and cellular components. Antigen specific lymphocyte receptors.
TOPICS INNATE IMMUNITY	Functions of granulocytes (neutrophils, basophils, eosinophils), dendritic cells, NK cells, monocytes and macrophages. Pattern Recognition Receptors (PRR) recognizing Pathogen-associated Molecular Pattern (PAMP) and Damage-associated Molecular Pattern (DAMP).
TOPICS CELLS AND TISSUES OF THE IMMUNE SYSTEM	Role of primary lymphoid organs (bone marrow and thymus) and secondary lymphoid tissues (lymph nodes, spleen, MALT: Mucosa-Associated Lymphoid Tissues) in the immune response.
TOPICS LEUKOCYTE MIGRATION. ANTIGENS	Adhesion molecules. Homing and migration of leukocytes into tissues. Antigens: definition and properties. Super-antigens. Mitogens.
TOPICS ANTIBODIES AND REPERTOIRE DIVERSITY. MONOCLONAL ANTIBODIES	Structure and effector functions of immunoglobulins. Classes/isotypes of immunoglobulins. Immunoglobulin gene organization and somatic recombination. Production and application of monoclonal antibodies.
TOPICS B LYMPHOCYTE DEVELOPMENT AND	B cell development and maturation. B cell receptor (BCR). Activation, proliferation and differentiation of B lymphocytes. Response to T-dependent and T-independent antigens. Primary and secondary immune response. Germinal center reaction: somatic hypermutation, isotype switch, selection and memory B cells generation.

HUMORAL IMMUNITY	
TOPICS COMPLEMENT	Classical, alternative, and lectin pathway. Functions of complement.
TOPICS MAJOR HISTOCOMPATIBILITY COMPLEX AND ANTIGEN PRESENTATION TO T LYMPHOCYTES	Gene Organization. Structure and functions of Major Histocompatibility Complex molecules. Antigen presenting cells (APC). Antigen processing.
TOPICS T LYMPHOCYTE CELL-MEDIATED IMMUNITY	T cell receptor (TCR). TCR gene organization and somatic recombination. T cell development and thymic selection. Activation and differentiation of T cells into effector T cells. Functions of T helper subsets, regulatory T cells and cytotoxic T cells. Effector mechanisms of cell-mediated cytotoxicity.
PROGRAM **IMMUNOPATHOLOGY**	Hypersensitivity disorders, IgE-dependent immune responses and allergic disease, immunologic tolerance and autoimmunity, transplantation immunology, immunity to tumors, congenital and acquired immunodeficiencies.

TEXTBOOKS	Cellular and molecular immunology – Abbas, A.K. – Elsevier, 8th Edition
EXAM METHOD	Written and Oral exam.

EXAM COMMISSION	The Coordinator, full Professors of the disciplines, Professors of similar disciplines, Specialists of the subject, compose the exam Commission of the Integrated Course.

Malisan Florence, President
Testi Roberto

CONTACTS

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PREREQUISITES: Previous knowledge and competence in the following subjects:
Human Anatomy 1, Histology and Embryology, Biology and Genetics, Chemistry and Introductory Biochemistry.

The specific learning outcomes of the program are coherent with the general provisions of the Bologna Process and the specific provisions of EC Directive 2005/36/EC. They lie within the European Qualifications Framework (Dublin Descriptors) as follows:

1. **Knowledge and Understanding**

- The objective of this course is to learn about the structural features of the components of the immune system, their functions, as well as the mechanisms involved in immune system development and responsiveness.
- Appreciate the strength and weakness of our immune system and what the consequences are in case of failure.
- Understand the ability of our immune system to defend against invading pathogens in a logical fashion. This includes our innate ability to defend against microorganisms (innate immunity); should this first line of defense fail, how we can fight infections (acquired immunity); if we react excessively, what price do we pay (hypersensitivity). If we misdirect our defense, what are the consequences (autoimmunity) and above all, how can we prevent pathogens from attacking us (vaccination).
- Assess of pathogenesis of diseases, interventions for effective treatment, and mechanisms of health maintenance to prevent disease.

2. **Applying Knowledge and Understanding**

- Apply theoretic knowledge to the clinical and laboratory setting, being able to recognize the general diagnostic aspects of immunologic diseases.
- Become familiar with procedures for performing and reporting laboratory experiments.
- Demonstrate capacity for problem-solving about immune responsiveness.
- Demonstrate knowledge of immunology into clinical decision-making through case studies presented in class.
- Provide a differential diagnosis based on a given specific clinical data.

3. **Making Judgements**

- Recognize the importance of an in-depth knowledge of the topics consistent with proper medical education.
- Identify the benefits and adverse effects of any diagnostic and therapeutic interventions.
- Identify the fundamental role of proper theoretic knowledge of the subject in the clinical practice.

4. **Communication Skills**

- Present topics orally in an organized and consistent manner.
- Use of proper scientific language coherent with the topic of discussion.

5. **Learning Skills**

- Identify possible use of the acknowledged skills in the future career.
- Assess the importance of the acquired knowledge in the overall medical education process.