



Degree Programme in Medicine and Surgery

Academic Year 2026 /2027

INTEGRATED COURSE (I.C.): _ Immunology and Immunopathology

NUMBER OF CFU (ECTS credits): 4

SSD (Academic Discipline Code): MEDS-02/A

TRACK A:

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PREREQUISITE COURSES

None required

PREREQUISITES

Basic knowledge of Human Anatomy, Biology, Molecular Biology, Histology, and Biochemistry is required.

LEARNING OBJECTIVES

The teaching of Immunology and Immunopathology aims to provide the student with the fundamentals for understanding the cellular and molecular mechanisms underlying the immune response. In particular, the student will have to learn:

- the general features of antigens, antibodies, and cytokines; the cells, tissues, and organs of the immune system; the regulatory mechanisms of central and peripheral tolerance; the components and molecular mechanisms of innate and adaptive immune responses

the main immunopathologic mechanisms, in particular: hypersensitivity reactions, immunodeficiencies, autoimmune disorders, transplantation, and tumor immunology

EXPECTED LEARNING OUTCOMES

The expected learning outcomes are consistent with the general provisions of the Bologna Process and the specific provisions of Directive 2005/36/EC. They are found within the European Qualifications Framework (Dublin descriptors) as follows:

DD 1: Knowledge and understanding

By the end of the courses, the student will be able to:

- know and explain the basic concepts of immunology
- know and explain the cellular and molecular mechanisms underlying the activation of the innate and adaptive immune response
- know and explain the main immunopathologic mechanisms

DD 2: Applying knowledge and understanding

By the end of the courses, the student will be able to:

- use the acquired knowledge for in-depth study of several aspects related to the specific field to which the student will dedicate herself/himself as part of her/his professional activity
- apply the acquired knowledge to analyze and understand the alterations of the cellular, immunological, and genetic mechanisms underlying human pathologies

DD3: Making judgements

By the end of the courses, the student will be able to:

- independently make general assessments related to the topics covered
- independently use the acquired knowledge to identify and explain the molecular, immunological, and pathophysiological mechanisms that lead to disease.

DD4: Communication skills

By the end of the courses, the student will be able to:

- clearly and unambiguously communicate information, ideas, problems, and solutions, related to the main molecular mechanisms of immune response activation as well as immunopathologic mechanisms to both expert and non-expert recipients
- use the scientific terminology as appropriate

DD5: Learning skills

By the end of the courses, the student will be able to:

- acquire the appropriate learning methods for studying and updating
- improve skills in the field of Immunology and Immunopathology by consulting texts, scientific literature, and databases

SYLLABUS

IMMUNOLOGY AND IMMUNOPATHOLOGY (MEDS-02/A)

The Immune System

- General features of the innate and adaptive immune response: specificity, diversity, immunological memory. Primary and secondary response.
- Cells and tissues of the immune system. Haematopoiesis. Primary and secondary lymphoid organs: anatomy and functions. The lymphatic system.
- Lymphocyte segregation in secondary lymphoid organs. Leukocyte circulation and migration in tissues.

The Innate Immunity

- Pathogen recognition. Receptors of innate immunity. The complement system: activation and biological functions.
- The effector functions of innate immunity: the inflammatory response, pro-inflammatory cytokines (local and systemic effects), and antiviral defences.

The Adaptive Immunity

- Antibodies: structural features and biological fragments. Antigen-antibody interaction.
- Major histocompatibility complex (MHC I, MHC II). Antigen processing and presentation. Antigen receptors (BCR, TCR): somatic recombination and receptor repertoire diversity. Development, maturation and activation of T and B lymphocytes. Maturation defects and lymphocyte activation.
- Helper and cytotoxic T lymphocytes: differentiation and effector functions.
- Antibody production. Germinal centre reaction: affinity maturation, isotype switch. Effector functions of antibodies.

Hypersensitivity reactions

- Mechanisms and classification of hypersensitivity reactions.
- Immediate hypersensitivity (Allergy). Antibody-mediated diseases. Immunocomplex-mediated diseases. Pathogenetic mechanisms of tissue damage. Delayed hypersensitivity

Immunological tolerance and autoimmunity

- Central and peripheral tolerance. Tolerance to commensal pathogens and fetal antigens
- Autoimmunity: genetic (HLA polymorphisms) and environmental (infections, molecular mimicry) factors.

Transplant Immunology

- General principles of transplant immunology. Immune responses to transplantation: direct and indirect recognition of alloantigens.
- Activation of alloreactive T and B lymphocytes
- Transplant rejection: acute, hyperacute, chronic rejection. Prevention and treatment. Transfusion reaction: blood group antigens.

Tumour Immunology

- Tumour antigens. Tumour microenvironment. Tumour immunotherapy
- Stimulation of host antitumor responses. Evasion mechanisms.

COURSE STRUCTURE

The course consists of 50 hours of classroom-based teaching with mandatory attendance (67%). Lectures will be structured in 2 or 3-hour theoretical lessons according to the academic calendar. The learning material will be organized in PowerPoint slides, video illustrating, and resuming updated program topics that will allow students to achieve the learning objectives. Interactive discussion with the students will be encouraged to improve active learning.

COURSE GRADE DETERMINATION

The knowledge acquired by the student will be evaluated through a written and oral exam.

- Written exam: 30 multiple-choice questions. One point will be assigned for each correct answer. Eighteen points will be required to be admitted to the oral exam.
- Oral exam: the students should take the final oral exam consisting of questions on the program's covered topics. Considering the learning objectives, the examining committee will assess the acquired student's knowledge and judgment ability, by evaluating the ability to argue and reason on the contents. The student's communication skills by using the appropriate scientific terminology will be also evaluated.

The final grade will be expressed out of thirty

The exam will be assessed according to the following criteria:

Fail	Significant gaps and/or inaccuracies in knowledge and understanding of the topics; limited analytical and synthesis skills; argumentation absent or frequently incorrect.
18–20	Barely sufficient knowledge and understanding of the topics, with possible imperfections; sufficient analytical, synthesis, and judgement skills.
21–23	Routine knowledge of the topics; correct analytical and synthesis skills with coherent logical argumentation.
24–26	Fair knowledge and understanding of the topics; good analytical and synthesis skills; rigorously expressed argumentation.
27–29	Complete knowledge of the topics; considerable analytical and synthesis skills; good independent judgement.
30–30L	Excellent level of knowledge and understanding. Considerable analytical, synthesis, and independent judgement skills. Original argumentation expressed with full command of specialized terminology.

OPTIONAL ACTIVITIES

To further clarify, the Teachers are available to meet the students through appointments taken by e-mail.

READING MATERIALS

The teachers will provide learning materials and scientific literature on the university WebApp

Textbook:

- Cellular and Molecular Immunology, 10th Edition, Abul Abbas, Andrew H. Lichtman, Shiv Pillai. Elsevier.
- Immunobiology di Janeway, 10 Ed. Kenneth Murphy & Casey Weaver