

**COURSE DATA****DATA SUBJECT****Code:** 34474**Name:** Immunology and immunopathology**Cycle:** Undergraduate Studies**ECTS Credits:** 4.5**Academic year:** 2025-26**STUDY (S)**

Degree	Center	Acad. year	Period
1204 - Degree in Medicine	Facultat de Medicina i Odontologia	3	Second quarter

**SUBJECT-MATTER**

Degree	Subject-matter	Character
1204 - Degree in Medicine	Human clinical training II	COMPULSORY

**COORDINATION**

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**SUMMARY**

Immunology constitutes an extensive subject that studies the immune system in physiological and pathological conditions and the way to modulate the response, stimulating or repressing it. The development that the immunology has experienced in the last recent years has contributed importantly for the development of several areas of medicine. Mainly, it has made possible the knowledge of fundamental pathogenic mechanisms and the emergence of new treatments that have modified the course of multiple diseases and the life of many patients. The organ transplantation, the treatment of the immunodeficiencies, the modulation of immunological mediators in auto-immunity and allergy and the cancer immunotherapy can be highlighted.

Its importance in the field of the health has triggered the constitution of the Immunology as a core subject in the study plans of the Degree in Medicine and as a medical specialty that involve the diagnosis and treatment of the diseases in which the immunitary system has a main role in the pathogenesis or in the therapeutic aspects.

The teaching is adressed to the objective for the student to acquire the theoretical and practical knowledge that allows them to know and understand the main immunopathological mechanisms, as well as the clinical manifestations and therapeutic orientation of diseases in which the immune system plays a fundamental role.



## PREVIOUS KNOWLEDGE

### RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

### OTHER REQUIREMENTS

It is recommend the knowledge of the subjects of Biology, Biochemistry, Physiology and General Pathology of the Degree in Medicine.

## COMPETENCES / LEARNING OUTCOMES

### 1204 - Degree in Medicine

Acknowledge diversity and multiculturality.

Acquire properclinical experience in hospitals, health care centres and other health institutions, under supervision, as well as basic knowledge of clinical management focused on the patient and the correct use of tests, medicines and other resources available in the health care system.

Capacity for communicating with professional circles from other domains.

Consideration of ethics as a fundamental value in the professional practise.

Criticism and self-criticism skills.

Establish the diagnosis, prognosis and treatment, applying principles based on the bestinformation available and on conditions of clinical safety.

Have the capacity to make an initial diagnosis and establish a reasonable strategy of diagnosis.

Indicate the most accurate therapy in acute and chronic processes prevailing, as well as for terminally ill patients.

Keep and use medical records which contain information about the patient for later analysis, preserving the confidentiality of personal data.

Know how to use IT in clinical, therapeutic and preventive activities, and those of research.

Know how to use the sources of clinical and biomedical information available, and value them critically in order to obtain, organise, interpret and communicate scientific and sanitary information.

Knows how to evaluate modifications in clinical parameters at different ages.

Knows how to perform a complete anamnesis, focused on the patient and orientated to various pathologies, interpreting its meaning.

Knows how to set an action plan, focused on the patients needs and the family and social envionment, which should be coherent regarding the patients symptoms and signs.



- Obtain and elaborate a clinical history with relevant information.
- Perform a physical examination and a mental health assessment.
- Plan and propose appropriate preventive measures for each clinical situation.
- Proper organisation and planning of the workload and timing in professional activities.
- Recognises, diagnoses, and guides the management of the main pathologies affecting the immune system.
- Recognises, diagnoses, and guides the management of vital risk situations.
- Team-working skills and engaging with other people in the same line of work or different.
- Working capacity to function in an international context.

## DESCRIPTION OF CONTENTS

### THEORETICAL LESSONS Block 1 (Lessons 1 to 6).

Lesson 1. Introduction. The immune system. Innate immunity and adaptive immunity. Humoral and cellular elements. Clonal selection theory.

Lesson 2. Structures for antigen recognition. Immunoglobulins: structure, properties, and biological functions. Ligands and receptors. Molecular bases of diversity and specificity. Histocompatibility molecules, the HLA system: classes, function, and importance.

Lesson 3. Lymphocytes: differentiation, phenotype, activation, and function. Morphology. Heterogeneity. Activation of the T lymphocyte. Antigen processing requirements. Antigen presenting cells. Activation and proliferation of T lymphocytes.

Lesson 4. Lymphocytes: origin and maturation. Lymphoid organs and lymphocyte trafficking. Origin and differentiation of lymphocytes. Bone marrow: histological structure, maturation of B lymphocytes. Thymus: histological structure, maturation of T lymphocytes, central tolerance. Lymphocyte trafficking. Lymph node: entry of antigens, entry and extravasation of lymphocytes. Migration of effector T lymphocytes. Lymphocyte migration Memory. Spleen: entry of antigens, entry and activation of lymphocytes.

Lesson 5. The complement system. General characteristics. Activation: classical pathway, alternative pathway, lectin pathway. Cellular receptors for activated complement proteins. Regulation. Functions: cell lysis, opsonization, elimination of immune complexes.

Lesson 6. Innate immune cells: activation and function. Macrophages, polynuclear leukocytes and dendritic cells. Molecular sequences associated with pathogens (pathogen-associated molecular patterns) and their receptors. Natural cytotoxic cells or natural killer cells: phenotype and function.

### THEORETICAL LESSONS Block 2 (Lessons 7 to 13).

Lesson 7. Immunological Defects I: Classification of PIDs. General characteristics, most representative clinical and laboratory data. Semiology, history, and examination aimed at diagnosing PIDs. PIDs of adaptive immunity. PIDs predominantly caused by antibodies and primary T-cell defects.



Lesson 8. Immunological defects II: PIDs due to defects in innate immunity. Complement factor deficiencies. Phagocytosis defects. Acquired immunodeficiency: AIDS, immunodeficiency associated with cancer, malnutrition, aging, and stress. Immune-neuro-endocrine interaction.

Lesson 9. Excess immunity I. Respiratory allergic diseases. Immunopathogenesis and immunophenotypes in asthma: Allergic T2 asthma, non-allergic eosinophilic T2 asthma, non-T2 asthma. Occupational asthma. AERD: Aspirin-exacerbated respiratory disease and its production mechanisms.

Lesson 10. Excess immunity II. Extrinsic allergic alveolitis (EAA) or hypersensitivity pneumonitis. Allergic bronchopulmonary aspergillosis (ABPA). Pulmonary eosinophilias. Genetic and environmental factors. Immunopathology and basic clinical expression. Clinical and serological diagnosis. Introduction to treatment with special reference to allergen immunotherapy and immunomodulatory therapy with biological agents.

Lesson 11. Allergic diseases of cutaneous and mucosal expression. Contact eczema, atopic dermatitis, and urticaria: immunopathogenesis, clinical, and immunobiological diagnosis.

Lesson 12. Anaphylaxis as a vital emergency syndrome. Immunopathology of the anaphylactic reaction, etiology, clinical manifestations, early recognition and treatment.

Lesson 13. Molecular basis of the immune response and tolerance. Mechanisms that trigger the immune response (presentation and recognition of antigens, cytokine network). Molecular bases of self-tolerance and tolerance to foreign antigens. Loss of tolerance: hypersensitivity and autoimmunity reactions.

## THEORETICAL LESSONS Block 3 (Lessons 14 to 20).

Lesson 14. Immunity Errors I. Morphological bases of autoimmune and inflammatory diseases. Pathology of autoimmune diseases. Mechanisms of injury production. Pathology of vasculitis.

Lesson 15. Immunity Errors II. Autoimmune diseases. Concept of autoimmunity and autoimmune disease. Autoantigens. Autoantibodies: description and clinical correlation. Clinical work classification. Biological alterations in the diagnosis of autoimmune disease. Pathogenic mechanisms of injury: antibodies, immune complexes and T lymphocytes. Autoimmune diseases intervened by immune complexes. Immunological description of the clinical and biological mechanisms in the most representative: Systemic lupus erythematosus and hypersensitivity vasculitis.

Lesson 16. Immunity Errors III. Mechanisms of autoimmune diseases intervened by T lymphocytes. Immune response intervened by cells. Scleroderma, rheumatoid arthritis and Sjögren's syndrome as the most representative: immunopathogenesis and its translation into basic clinical and biological data for diagnosis.

Lesson 17. Immunity Errors IV. Diseases affected by T lymphocytes and granulomas. Concept. Classes and immunopathogenesis. Immune response intervened by Th1 cells. Granuloma formation. Systemic necrotizing vasculitis. ANCA-mediated vasculitis: classes, immunopathogenesis. Main clinical, biological data and bases for treatment.

Lesson 18. Morphological bases of organ transplantation. Morphological bases. Graft versus host disease. Opportunistic infections in the immunosuppressed State.

Lesson 19. Mechanisms of the inflammatory reaction. Adhesion molecules and their ligands. Leukocyte trafficking. Acute and chronic inflammation. Most representative clinical cases. Immunopathology of infection. Sepsis. Immunopathological evaluation of polytrauma patients and major burn victims. Food allergy: causes, immunopathology, symptoms, diagnosis (prick, specific IgE, provocation), and treatment. Allergic reactions to drugs: classification, immunopathology, symptoms, diagnosis (prick, intradermal reaction, provocation), and usefulness of laboratory tests. Desensitization.

Lesson 20. Laboratory tests in immunology: 1) Laboratory tests: Serological and cellular tests 2) Immunopathology: Quantification of immunoglobulins. Flow cytometry for the study of lymphocyte populations. Phagocytosis test. Autoantibodies. Lymphocyte and basophil activation test. Cancer Immunology and Immunotherapy.



## PRACTICAL LESSONS.

### SEMINARS IN HOSPITALS:

1. Hypersensitivity reactions. Effector mechanisms of damage. Types, classification. Most representative clinical cases.
2. Transplant immunobiology. Types of transplantation. Activation of the alloimmune response. Allogeneic hematopoietic progenitor cell transplantation. Rejection and graft-versus-host disease.
3. Autoinflammatory and autoimmune diseases. Clinical, biological, and genetic bases expressed in paradigmatic cases of the most representative ones.
4. Immune response to infection. Paradigmatic cases: Acquired Immune Deficiency Syndrome and SARS-CoV-2 infection.
5. Contributions of immunology to therapeutics. Immunomodulatory molecules and their revolutionary impact on cancer immunotherapy, infection, vaccination, and T2-predominant diseases, among others.

### LABORATORY TRAINING:

1. Microscopy of cells of the immune system.
2. Microscopy of the organs of the immune system.
3. Microscopic morphological aspects in the diagnosis of autoimmune diseases (I).
4. Microscopic morphological aspects in the diagnosis of autoimmune diseases (II).

### PRÁCTICAS CLÍNICAS EN LOS HOSPITALES:

Supervised clinical practices in hospital services where patients with pathologies of the immune system are diagnosed and treated: autoimmune diseases, allergic diseases and immunodeficiencies. Approach to anamnesis, clinical examination, diagnostic guidance and therapeutic approach as an integration of the mechanisms studied

### ANALYSIS OF CLINICAL CASES AND LABORATORY SEMINARS:

Clinical cases of immune pathology. Generic analysis of how they translate into diagnostic, management and treatment methods.

## WORKLOAD

### PRESENCIAL ACTIVITIES

Activity	Hours
Theory	19,00
Seminars	19,00
Laboratory	6,00
In-class tutorials	0,00
Clinical practice	12,00



Total hours	56,00
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## NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	36,25
Preparation of lessons	10,00
Preparation for assessment activities	0,00
Resolution of case studies	10,00
Preparation of supplementary reports	0,00
Preparation of the internship report and evaluation of the internship	0,00
<b>Total hours</b>	<b>56,25</b>

## TEACHING METHODOLOGY

In the theoretical classes, the teacher will present the contents of the program. The practical credits will be taught in the form of seminars, laboratory practices and clinical practices. The seminars deal with practical content that completes the theoretical program focused on its application to the clinic. In laboratory practices, students can observe and identify cells and other structures of the immune system under the microscope. They also learn to distinguish the microscopic morphological facts that characterize and distinguish the main autoimmune and inflammatory diseases from each other, and that are used in the diagnosis.

Clinical practices train students in taking a clinical history and interpreting diagnostic tests aimed at immune pathology. In addition, students generally observe the indications for the different immunologically based treatments.

The theoretical and practical modalities of teaching address the same general objectives of the subject with different methodologies. Therefore, the theoretical and practical contents are not independent, but complementary and related to each other.

The gender perspective and the sustainable development goals (SDGs) will be incorporated into teaching, whenever possible.

## EVALUATION

**Theoretical evaluation: 50% of the final grade.**

It will cover the contents of the theory syllabus and will be the same for all groups. It will be integrated by a multiple-choice test, consisting of up to 100 questions. Correct answers will have a value of 1 point, incorrect answers will subtract 0.333 and unanswered questions will be awarded 0 points. Maximum score:



10, pass mark: 5 points.

**Practical evaluation: 50% of the final grade.**

This evaluation will be integrated by a multiple choice test with maximum of 65 questions on seminars and clinical skills (up to 50 questions) and up to 15 questions on laboratory practice. Maximum score: 10, pass mark: 5 points.

Final grade: (Theory evaluation + practice evaluation)/2. It is necessary to overcome both parts (theory and practice) to pass the subject.

Attendance at practical activities is mandatory. The student is considered to meet this requirement if he or she has attended a minimum of 80% of these activities and has adequately justified the impossibility of attending the remaining sessions due to the occurrence of a cause of force majeure.

Unjustified non-attendance to more than 20% of them will mean the impossibility of passing the subject.

Throughout the course, continuous evaluation may be carried out, both in the theoretical part and in the practical part. This evaluation is voluntary and can have different modalities ¿ test, essay questions or others. The score obtained will be added to the final grade but only for those students who have passed the theoretical exam and the practical exam.

Students are reminded of the importance of carrying out evaluation surveys among all teaching staff of the degree subjects.

## REFERENCES

### BASIC

- Abbas AK, Lichtman AH, Pillai S. Cellular and molecular immunology. (10<sup>a</sup> Ed). Elsevier. 2021.
- Helbert M. Immunology for medical students. (3<sup>a</sup> Ed). 2017.
- Fainboim L and Geffner J. Introducción a la inmunología humana. (6<sup>a</sup> Ed). Editorial Médica Panamericana. 2011.
- Kubi Inmunología. (8<sup>a</sup> Ed) McGraw Hill Medical. 2020.
- Regueiro JR, Martínez E, Corell A. Inmunología. Biología y patología del sistema inmunitario. (Quinta Edición). Panamericana. 2022.
- Robbins y Cotran. Patología estructural y funcional. 10<sup>a</sup> Edición 2021.

### RECURSOS e-Salut:

- ClinicalKey Student Medicina, Odontología y Enfermería [ <https://uv-es.libguides.com/RecursosSalu> ].
- Acces Medicina [ [https://uv-es.libguides.com/Access\\_Medicina](https://uv-es.libguides.com/Access_Medicina) ].
- Médica Panamericana [ [https://uv-es.libguides.com/Medica\\_Panamericana](https://uv-es.libguides.com/Medica_Panamericana) ]



COMPLEMENTARY

- Murphy KM, Weaver C, Berg LI. Janeways Immunobiology. (10th Edition). WW Norton and Company. 2022.
- Fauci AS, Braunwald DL, Kasper SL, Hauser DL, Longo JL, Jameson JL and Loscalzo J. Harrison's Principles of Internal Medicine. (21 Ed). 2022.