VNIVERSITAT DE VALÈNCIA

Course Guide
33149 Immunology and immunopathology

COURSE DATA

DATA SUBJECT

Code: 33149
Name: Immunology and immunopathology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1109 - Degree in Biochemistry and Biomedical Sciences	Facultat de Ciències Biològiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1109 - Degree in Biochemistry and Biomedical Sciences	Integración fisiológica y fisiopatológica	COMPULSORY

COORDINATION

COSTELL ROSSELLO M MERCEDES

GIL HERRERO M LUISA

SUMMARY

The subject immunology and immunopathology is located in the fourth and final year of the Degree in Biochemistry and Biomedical Sciences of the University of Valencia and is integrated into the subject Physiological Integration and Pathophysiology. It is a compulsory 6-credits subject, coursed during the first semester which has been preceded by the study, among others, of the matters of Cell Biology, Microbiology, Biochemistry, Genetics and Molecular Biology and Methods in Molecular Biosciences, as well as the subjects of Cell dynamic and signalling, Tissue organization and Physiology, in which the student has developed and assimilated knowledge as a basis for Immunology.

The aim of the curriculum of Immunology and immunopathology is to introduce the students to the general principles of organism defence. The program will develop the cellular and molecular processes of natural immunity and specific immunity, in order to understand the mechanisms of recognition, activation, maturation and activity of immune effectors. It also delves into the immunopathological mechanisms responsible for diseases caused by alterations of the immune response. Finally, the students will become familiar with the main techniques used in laboratories for serological and immunological diagnostic.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1101 -

Comprensión y manejo de las estrategias experimentales y métodos utilizados en la investigación de las materias.

Conocer las bases celulares y moleculares de los procesos de inmunidad innata e inmunidad específica.

DESCRIPTION OF CONTENTS

1. Introduction and basic components

Introduction to the immunology. Historical overview of immunology. Overview of immune responses. The anatomy of the immune system. Cells, organs and tissues of the immune system. Lymphocyte traffic and recirculation. Analysis and selection of immune cells by flow cytometry.

2. Antigen recognition

Antigens and antibodies. Immunoglobulin structure: isotypes and their functions. B lymphocyte receptor. Generation of antibody diversity. Major Histocompatibility Complex. Structure of the MHC and CD1 molecules. Pathways for antigen processing and presentation to T lymphocytes
T-cell receptor. Structure of T lymphocyte receptor for antigen and accessory molecules. Generation of diversity.

3. Maturation and regulation of lymphocytes

Maturation of B and T lymphocytes. B-cell maturation in the bone marrow. T cell maturation. Mechanisms

for generating central tolerance. Survival of lymphocytes in peripheral lymphoid tissues. Receptor signalling in lymphocytes. Cytokines. Cytokines that mediate and regulate innate and adaptive immunity. Chemokines.

4. Effector mechanisms of the innate immune response

Natural immunity. Patogen-associated molecular pattern receptors. Activation of macrophages and dendritic cells and phagocytosis. The complement system. Acute phase response.

5. Effector mechanisms of the adaptive immune response

Effector mechanisms of adaptive immunity mediated by cells. Mechanisms for helper and cytotoxic T-cell activation. Regulatory T-cells. Lymphocytes T gamma-delta, NK and NKT. Effector mechanisms of the adaptive humoral response. Effector B-cell activation. Isotype switching, plasma and memory cells. Mucosal Immunity. Oral tolerance. Types of immunoglobulins and antigen presenting cells characteristic of mucous membranes. Integration of the immune response. The inflammatory process. Inflammatory mediators. Molecules of adhesion. Extravasation of leukocytes.

6. Immunity in the defense and disease

Characteristics of the immune responses against microorganisms. Immunity against bacteria, viruses, fungi and parasites. Immunodeficiencies: main congenital and acquired immunodeficiencies. Hypersensitivity reactions: general characteristics and types. Autoimmunity: central and peripheral tolerance. Autoimmune diseases: examples and etiology. Tumor immunology: changes in the surface of tumor cells. Immune responses against tumors. Hematopoietic cancers. Immunotherapy of cancer. Transplantation Immunology. Mechanisms of graft rejection. Immunology of human reproduction.

7. Applications of immunogenicity

Regulation of the immune response. Production of monoclonal and polyclonal
antibodies. Monoclonal antibody engineering. Biotechnological uses. Vaccine design. New generation vaccines. Immunotherapy. Check point concept in cancer immunotherapy. Car-T cells.

8. Practical classes

Practice 1. Quantification of phagocytic and microbicidal capacity of human blood.
Practice 2. Indirect and competitive ELISA. Titration of a rabbit antiserum,
avidity analysis, and quantitation of antigens.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	3,00
Theory	42,00
Laboratory	15,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	48,00
Preparation of lessons	16,00
Preparation for assessment activities	21,00
Resolution of case studies	5,00
Total hours	**90,00**

TEACHING METHODOLOGY

The course is organised into:

1. Thirty-six lectures of one hour for the development of the theory program, which should be preceded by the student reading of the chapters or sections indicated in the Study Guides. From the beginning until the end of the course. Attendance at these sessions is optional for the student.

2. Laboratory sessions (15 hours) to implement the program of practical classes, after reading the booklet of practices, facilitated by the professor. Attendance at practical sessions is compulsory for all students and failure to attend 20% or more sessions will disqualify the student to pass that part of the course.

3. Three hours of tutorials focused on solving in group test questions and questions examples similar to

the exam.

4. Two hours of seminars to be taught by visiting researchers

EVALUATION

The course is organised into:

1. Theoretical lectures of one hour for the development of the theory program, which should be preceded by the student reading of the chapters or sections indicated in the Study Guides. From the beginning until the end of the course. Attendance at these sessions is optional for the student.

2. Laboratory sessions (15 hours) to implement the program of practical classes, after reading the protocol of practices, facilitated by the professor. Attendance at practical sessions is compulsory for all students and failure to attend 20% or more sessions will disqualify the student to pass that part of the course.

3. Three hours of group tutorials for the resolution of questions and pre-exam issues raised by the professor, including the presentation of examples. These sessions will be conducted in small groups.

4. Two hours of seminars to be taught by visiting researchers

REFERENCES

- Inmunología. Fundamentos (12ª Edición). Roitt, Ivan y col. Editorial Médica Panamericana, 2014.
- Inmunología Celular y Molecular (10ª Edición). Abbas, Abul K y col. Ediciones Elsevier, 2022. Disponible en la plataforma e.Library.
- Inmunología. Biología y patología del sistema inmunitario (5ª Edición). Regueiro Gonzalez y col. Editorial Médica Panamericana, 2022.
- Inmunología. (2ª Edición) Parham Peter. Adaptación de Immunobiology de Janeway Ch.A. Editorial Médica Panamericana, 2006.
- Inmunología de Kuby. (8ª Edición). Kindt, Thomas y col. Editorial McGraw-Hill Interamericana, 2020. Disponible como libro electrónico en la biblioteca.
- Revistas científicas especializadas en revisiones: Annu. Rev. Immunol., Nat. Rev. Immunol., Curr. Opin. Immunol., Immunol Rev., Trends Immunol.
- Libre acceso a artículos científicos a través de PubMed: http://www.ncbi.nlm.nih.gov/sites/entrez
- Libre acceso a libros on-line (NCBI Bookshelf): http://www.ncbi.nlm.nih.gov/sites/entrez/query.fcgi?db=Books
- Inmunología. (10ª Edición). David Male y col. Ediciones Elsevier, 2026.