Universidad de Navarra

*From the molecule to the cell II (F.Medicina)*

*Guía docente 2026-27*

# INTRODUCTION

**Brief description:** From the Molecule to the Cell II studies the molecules and cells of the immune system that allow us to respond to foreign agents. After describing pathogenic microorganisms with clinical importance, their mechanisms of pathogenicity and existing antimicrobial therapies, the subject will cover the study of the subpopulations of immune cells involved in pathogen recognition and how these cells are generated. Thus, main histologic features of blood cells and the lymphoid organs will be presented, as well as the physiology of erythrocytes, description of blood groups and the regulation of the clotting system and fibrinolysis. Finally, integrated functions of immune cells, showing the basic principles of defense against representative pathogenic agents will be described.

- Basic course, 6 ECTS Credits
- First Year, Second trimester
- Course's character: Basic
- Degree: Medical Degree
- MODULE I: Morphology, structure and function of the human body
- Subject: Biochemistry and cell biology
- Language: English

**Classroom**: 4E02

## Faculty


- Pablo Sarobe Ugarriza CV (Course Director). Profesor Ordinario, Programa de Inmunología e Inmunoterapia, CIMA Universidad de Navarra. psarobe@unav.es
- Fernando Pastor Rodríguez CV. Profesor contratado doctor. Programa de Terapias Moleculares, CIMA-Universidad de Navarra. fpasrodri@unav.es
- Tomás Maira Litrán CV. Profesor Titular. Departamento de Microbiología. Universidad de Navarra. tmairalitra@unav.es
- Carlos De Andrea CV. Profesor contratado doctor. Departamento de Patología, Anatomía y Fisiología. Universidad de Navarra ceandrea@unav.es
- Luis Esteban Tamariz Amador. Departamento de Hematología. CUN. ltamariz@unav.es


image Macroph-bacteria(1).jpg

### LEARNING OUTCOMES (Competencies)

LO1 – That students have shown themselves to possess and understand knowledge in an area of study that develops from general secondary education, and is usually at a level that, although requiring advanced textbooks, also includes some aspects that imply knowledge from the forefront of their field of study.

LO2 – That students know how to apply their knowledge, in a professional manner, to their work or vocation, and that they possess the abilities that are usually demonstrated through the preparation and justification of arguments and the resolution of problems in their field of study.

LO3 – That students have the capacity to collate and interpret relevant data (normally within their area of study) in order to express opinions that include reflection on relevant subjects of social, scientific or ethical nature.

LO4 – That students can transmit information, ideas, problems and solutions to specialist and non-specialist audiences alike.

LO5 – That students have developed the learning skills necessary to carry out further study with a high level of autonomy.

LO10 – To recognize one's own limitations and the need to maintain and update one's professional abilities, lending special importance to learning new knowledge and techniques in an autonomous way and to being motivated by a quest for quality.

LO11 – To develop professional practice with respect to other health professionals, acquiring teamwork skills.

LO12 – To understand and recognize the structure and normal function of the human body at the levels of the molecule, cell, tissue, organ and system over the different stages of life and in both sexes.

LO14 – To understand and recognize the effects, mechanisms and manifestations of disease on the structure and function of the human body.

LO28 – To communicate in an effective and clear way, both when speaking and in writing, with patients, with family members, with media, and with other professionals.

LO29 – To establish good interpersonal communication skills to facilitate relating efficiently and sympathetically with patients, family members, media, and other professionals.

LO30 – To recognize a population's determinants of health, both genetic and those that depend on sex, life-style, demography, environment, and social, economic, psychological and cultural factors.

LO36 – To know about, to critically evaluate and to know how to use sources of clinical and biomedical information to obtain, organize, interpret and communicate scientific and health information.

LO47 – To know cellular structure and function.

LO48 – Bio-molecules.

LO52 – Cellular communication.

LO55 – Cellular differentiation and proliferation.

LO56 – Genetic information, expression and regulation.

LO57 – Inheritance.

LO59 – To know the morphology, structure and function of the skin, the blood, and circulatory, digestive, locomotor, reproductive, excretory and respiratory apparatuses and systems; the endocrine system, the immune system and the central and peripheral nervous system.

LO61 – Homeostasis.

LO62 – Adaptation to the environment.

LO65 – To recognize the morphology and structure of tissues, organs and systems with macroscopic and microscopic methods and with imaging techniques.

LO81 – To recognize the need to maintain professional competence.

LO89 – Vaccines.

LO97 – To know about, to critically evaluate and to know how to use sources of clinical and biomedical information to obtain, organize, interpret and communicate scientific and health information.

LO103 – To use search and retrieval systems for biomedical information.

LO105 – To understand and critically interpret scientific texts.

# PROGRAM

From the Molecule to the Cell II

- Blood cells: erythrocytes, leukocytes (granulocytes, mononuclear cells)
- Hematopoiesis: hematopoietic niches, the vascular niche, endosteal niche. Hematopoietic cell subsets
- Physiology of red blood cells
- Hemostasis and coagulation
- Control of coagulation and fibrinolysis
- Cells and molecules of the immune system
- Antigen, immunogen and hapten
- Microorganisms of clinical relevance: bacteria, virus, fungi and parasites. Main features and mechanisms of pathogenicity
- The immunoglobulin molecule: structure, genetics and function. Isotype and idiotype.
- Major histocompatibility complex (MHC) molecules: structure, genetics and function. MHC restriction. HLA and disease. HLA and transplant.
- The T cell receptor: structure, genetics and function. T lymphocyte subsets.
- Antigen presentation. Types of antigen-presenting cells.
- Lymphocyte ontogeny
- Primary lymphoid organs: bone marrow and thymus
- Activation and differentiation of T lymphocytes
- Activation and differentiation of B lymphocytes. T-B cooperation
- Peripheral lymphoid tissues: lymph nodes and spleen
- Cell-mediated effector mechanisms
- Complement: molecules, function and regulation

- Integration of cellular and molecular nechanisms of the innate and adaptive immunity in the defense against intracellular and extracellular bacteria, viruses and parasites.
- Flow cytometry

# EDUCATIONAL ACTIVITIES

Lectures: They will cover an important section of the contents, explaining the most important topics and issues, and helping to answer questions. (40 h)

Flipped classroom methodology: It will be used for less complex contents, where previous knowledge by students will facilitate lecture development.

- Videos or texts will be provided in advance for previous study and make the most of the lectures.
- Acquired knowledge will be evaluated at the beginning of the lecture.

Team based learning sessions :

- Students organized in groups will work on conceptual questions, clinical cases, laboratory results, microscopy images, etc.
- Intra- and inter-group discussion will facilitate solid acquisition of concepts previously explained in theory lectures, as well as of new contents and concepts. (10 h)

Personal study: This will include materials with contents previously provided as well as that acquired in theory lectures and TBL sessions.

Mentoring: the teachers will be available by email or personal tutorials with the students

# ASSESSMENT

ORDINARY EXAM

- Final exam based on multiple choice questions to assess knowledge and abilities acquired in: a) theory lectures, b) team-based learning sessions and c) flipped classroom sessions.
- Continuous formative assessment (CFA): these activities may constitute an additional 10 % of the score (total final score 11 points).
- CFA will be added to the score of the final exam only to those students who pass the exam.
- To pass the exam it is necessary to obtain a sufficient performance in each of the Didactic Units of the subject.

EXTRAORDINARY EXAM

- A final exam equivalent to that corresponding to the ordinary exam.
- CFA score will be kept, and added according to the same criteria explained above.

SPECIAL SITUATIONS

Universidad de Navarra

Those students who cannot attend the face-to-face exam for justified reasons will be given a second face-to-face exam date. The exam will be equivalent in content and requirement but may change the format or type of exam according to the decision of the Professor responsible for the subject.

## OFFICE HOURS

Attention to the student will be by appointment through the teacher's email:

- Pablo Sarobe Ugarriza psarobe@unav.es
- Fernando Pastor Rodríguez fpasrodri@unav.es
- Tomás Maira Litrán CV. tmairalitra@unav.es
- Carlos De Andrea CV. ceandrea@unav.es
- Luis Esteban Tamariz Amador. ltamariz@unav.es

## BIBLIOGRAPHY AND RESOURCES

### Microorganisms

Microbiología Médica (9ª Ed). P.R.Murray, K.S.Rosenthal, M.A.Pfaller. Elsevier 2021. Find it in the Library (e-book)

### Blood molecules and cells

Fisiología (6ª Ed). LS. Costanzo. Elsevier. Este libro es sencillo y puede ser muy útil para comprender conceptos básicos. Find it in the Library (e-book)

Berne & Levy physiology. BM. Koeppen, BA. Stanton et al. (8th Ed). . Elsevier. Este libro es más extenso que el anterior y más completo. Se puede utilizar para profundizar en algunos temas puntuales. Find it in the Library

### Immune system-related molecules and cells

Inmunología básica. Funciones y trastornos del sistema inmunitario. (6ª Ed). AK Abbas, AH Lichtman, S Pillai. Elsevier 2020. Find it in the Library (e-book)