

Degree	Type	Year
2500252 Biochemistry	OB	3

Contact

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

The students should have obtained the competences of the previous degree courses.

Objectives and Contextualisation

Objectives of the course:

The 6 ECTS course of Immunology is split in three blocks with different objectives that the student will have to achieve at the end of the course.

Block I. Basic Immunology

- to know the concepts of innate and specific immunology and to recognize the important role of each of them during the response against pathogens.
- to identify the elements that play a role in both responses.
- to enumerate and explain the structural and functional features of the molecular and cellular components of the innate and adaptive immunity.
- to explain the features of the lymphoid organs and the recirculation of lymphocytes.

Block I. Organization of the Immune Response

- to integrate the elements described in the lessons of the Block I with the three phases of the immune response: 1) activation phase; 2) effector phase; and 3) regulation phase and homeostasis.
- to identify the type of immune responses activated for each infectious agent: bacteria, virus, fung and parasites.

Block III. Immunopathology and Immunotherapy

- to identify the disfunction of the immune system which is the cause of the immunopathologies: hypersensitivity, immunodeficiencies and autoimmunity.

- to analyze the association of an inefficient response against infectious agents and certain immunopathologies.
- to associate the targets of the immune response of different palliative and prophylactic treatments.

Competences

Identify and solve problems.

Identify the molecular mechanisms of pathogenesis and relate them to the response to infection in order to design and develop strategies for diagnosing and combating diseases caused by microorganisms.

Obtain, select and manage information.

Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.

Work individually or in groups, in multidisciplinary teams and in an international context.

Learning Outcomes

Analyse the relationship between the type of immune response that is developing and the characteristics of the pathogen: the entry pathway and anatomical location, the mechanisms that trigger response and evasion.

Explain the mechanisms of activation and regulation of the cellular and humoral immune response and their link to immunopathology.

Identify and solve problems.

Know and define the properties that distinguish the adaptive immune response from the innate response and explain the theory of clonality: one lymphocyte, one antigen receptor.

Obtain, select and manage information.

Understand the theoretical principles behind the immunological techniques used in the characterisation and study of microorganisms.

Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.

Work individually or in groups, in multidisciplinary teams and in an international context.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Describe and identify the structural and functional characteristics of nucleic acids and proteins including their different organisational levels.
- Describe the genetic bases of the development and control of genic expression.
- Develop self-directed learning.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Reason critically.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Use and manage bibliographic information or computer or Internet resources in the field of study, in one's own languages and in English.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Describe the mechanisms for regulating genic expression in viruses, bacteria and eukaryotes.
3. Develop self-directed learning.
4. Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
5. Reason critically.
6. Relate the structure of nucleic acids with their biological functions.
7. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
8. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
9. Use and manage bibliographic information or computer or Internet resources in the field of study, in one's own languages and in English.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Collaborate with other work colleagues.
- Combine research and the generation of knowledge with problem-solving in one's own field, showing sensibility to ethical and social questions.
- Define the structure and function of proteins and describe the biochemical and molecular bases of their folding, intracellular traffic, post-translational modification and replacement.
- Demonstrate understanding of the components of the immune system, their structure and function and their mechanisms of action.
- Design experiments and understand the limitations of experimental approaches.
- Interpret experimental results and identify consistent and inconsistent elements.
- Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
- Make an oral, written and visual presentation of one's work to a professional or non-professional audience in English and understand the language and proposals of other specialists.
- Manage information and the organisation and planning of work.
- Read specialised texts both in English and one's own language.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take responsibility for one's own learning after receiving general instructions.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Think in an integrated manner and approach problems from different perspectives.
- Understand the language and proposals of other specialists.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Analyse the relationship between the nature of the immune response and the molecular and physical characteristics of the antigens that induce it.
3. Collaborate with other work colleagues.
4. Combine research and the generation of knowledge with problem-solving in one's own field, showing sensibility to ethical and social questions.
5. Define the properties of adaptive immune response and how it differs from innate response.

6. Describe the activation pathways of the receptors of the immune system and the intracellular and extracellular intermediaries involved in these pathways.
7. Describe the clonal distribution of lymphocyte antigen receptors and justify the theory of clonal selection: one lymphocyte, one receptor.
8. Describe the theoretical principles of immunological techniques.
9. Design experiments and understand the limitations of experimental approaches.
10. Explain the mechanisms of activation and regulation of cellular and humoral immune response.
11. Explain the processes of diversity generation in the clone receptors of the immune system.
12. Identify and analyse the proteins involved in the principal functions of the immune system: innate response, antigen presentation, antigen elimination, response regulation.
13. Interpret experimental results and identify consistent and inconsistent elements.
14. Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
15. Make an oral, written and visual presentation of one's work to a professional or non-professional audience in English and understand the language and proposals of other specialists.
16. Manage information and the organisation and planning of work.
17. Read specialised texts both in English and one's own language.
18. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
19. Take responsibility for one's own learning after receiving general instructions.
20. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
21. Think in an integrated manner and approach problems from different perspectives.
22. Understand the language and proposals of other specialists.

Content

Each block is divided in teaching units (TU) organized by lessons defining the specific learning descriptors associated to the corresponding competences.

Block I. BASIC IMMUNOLOGY: ELEMENTS OF THE IMMUNE SYSTEM

Lesson 1. Introduction

TU-1. Innate immunity

Lesson 2. Innate immunity

Lesson 3. The complement system

Lesson 4. Cells of the innate immunity

TU-2. Antigen specific receptors, presenting molecules and antigen recognition

Lesson 5. Structure of immunoglobulins

Lesson 6. Organization of the genes of immunoglobulins

Lesson 7. T cell receptor (TCR)

Lesson 8. Structure and function of the Major Histocompatibility Complex (MHC) molecules

Lesson 9. Antigen processing and recognition

Lesson 10. Genetic organization of the MHC

TU-3. Cells of the immune system

Lesson 11. T lymphocytes

Lesson 12. B lymphocytes and antigen presenting cells

TU-4. Organs of the immune system and lymphocyte recirculation

Lesson 13. Organization of the organs of the immune system

Lesson 14. Cytokines and chemokines

Lesson 15. Leukocyte recirculation

Block II. ORGANIZATION OF THE IMMUNE RESPONSE

UD-5. Immune response

Lesson 16. Cellular immune system I

Lesson 17. Cellular immune system II

Lesson 18. Humoral immune system I

Lesson 19. Humoral immune system II

Lesson 20. Regulation of the immune response

UD-6. Immune response against pathogens and mechanisms of action

Lesson 21. Immune response against bacteria, fungi and parasites I

Lesson 22. Immune response against bacteria, fungi and parasites II

Lesson 23. Immune response against virus

Block III. IMMUNOPATHOLOGY AND IMMUNOTHERAPY

UD-7. Immunopathology

Lesson 24. Reactions of hypersensitivity I

Lesson 25. Reactions of hypersensitivity II

Lesson 26. Autoimmunity

Lesson 27. Immunodeficiencies I

Lesson 28. Immunodeficiencies II

Lesson 29. Immunotherapy. Vaccines

Lesson 30. Tumor immunology

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom practices	8	0.32	3, 4, 9, 13, 15, 16, 17, 19, 21

Lectures	37	1.48	2, 3, 5, 6, 7, 8, 10, 11, 12, 15, 19
Type: Supervised			
Data interpretation	8	0.32	3, 4, 13, 16, 17, 21
Type: Autonomous			
Seminar preparation	32	1.28	3, 9, 13, 15, 16, 17, 19, 21
Study	58	2.32	3, 4, 13, 16, 17, 19, 21

The group for lectures will be the total number of students enrolled.

The class group will be divided into two to carry out the classroom practices that will be taught in 8 hours in which cases and scientific articles will be discussed.

Expositive Classes (lectures):

The 30 topics in the program will be taught in 37 lectures.

Classroom practices:

Classroom practices (PAUL) will be group activities to reinforce the theoretical content and give tools to understand the scientific articles related to the subject. Transversal skills such as searching will also be worked on bibliography, oral communication, dinamization of the class group.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

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Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
First partial exam	40%	3	0.12	5, 6, 7, 11, 12, 16, 19
Group seminar	20%	1	0.04	1, 3, 4, 8, 9, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Second partial exam	40%	3	0.12	2, 8, 9, 10, 13, 16, 17, 19, 21

ASSESSMENT

Partial exams: two partial exams, at the end of Blocks I and III. Each test will be worth 40% of the final grade. They will be multiple choice exams with 5 options. In the correction, 1/4 of the value of each question will be subtracted for an incorrect answer. The student must answer 70% of the exam questions to be evaluated. The duration of each test will be a maximum of 2 hours.

Classroom practices: Seminars and classroom practices help the development of students' self-learning, synthesis and written and oral communication skills. The assessment will represent 20% of the final mark of the subject and will assess the demonstrated knowledge, the written summary, the answer to and the ability to solve the questions posed and the relevance of the questions proposed in the class. Attendance is mandatory. As the objective of this activity is to encourage group work among students, so that they all actively participate in the proposed activity, the final grade of the activity will be distributed by the same group.

Final Exam: A final exam will be scheduled for students who have not reached the minimum required (that is, they do not have a minimum of 3.5 in the first partial and/or 4 in the second partial or do not reach a 5 in the total of the course) or who want to raise the grade. The final exam will be by partials and will have a value of 40% each of them. Likewise, to pass the subject a minimum grade of 4 is required in this exam as a whole, provided that the final result of the 3 evaluable activities is ≥ 5 .

To be eligible for the retake process, students must have previously been assessed in a set of activities whose weight is equivalent to a minimum of two-thirds of the total grade of the subject or module. Therefore, the student will obtain the qualification of "Not Assessable" when the assessment activities carried out have a weighting of less than 67% in the final qualification.

CONTINUED AVALUATION:

- 1) The subject can be approved by partials as long as the average between the 3 assessment activities is a 5, bearing in mind that an average can only be made with a minimum grade of 3.4 in the first partial and 4 in the second one. The partial exams are retrievable.
- 2) To recover: Students who have not passed with the sum of the two partial exams, may take the suspended partial exam. In the case of not passing any part during the course, a final exam will have to be taken.
- 3) If the student has passed the PAUL but not the exams, the grade obtained will be the one obtained in the exams. The classroom practices grade will be kept until the student passes the subject.
- 4) Failure to appear at any of the tests must be justified. The reason must be important enough to consider taking the exam on another day. The justification must be submitted to the teacher as soon as possible, sending the document by email.

UNIQUE ASSESSMENT:

- 1) Students who take the single assessment will take a single summary test in which the contents of the entire theory program of the subject will be assessed. The exam will consist of test-type questions with 5 options to choose one. In the correction, 1/4 of the value of each question will be deducted for an incorrect answer. The student must answer 70% of the exam questions to be evaluated. The grade obtained in this synthesis test will account for 80% of the final grade of the subject.

The single assessment test will coincide with the same date fixed in the calendar for the last continuous assessment test and the same recovery system will be applied as for the continuous assessment.

- 2) The assessment of classroom practice activities will follow the same process as the continuous assessment. The grade obtained will account for 20% of the final grade of the subject.

Bibliography

Bibliography

Books in English:

Kuby Immunology by J Owen, J Punt, S Stranford, P. Jones. Mc Graw Hill, 8th Edition (2018). ISBN: 978-1319114701

Janeway's Immunobiology by K. Murphy, C. Weaver, L.J. Berg. Norton & Company; 10th ed (2022). ISBN:978-0393884913

Cellular and Molecular Immunology by Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai, Elsevier 10th ed (2021). eBook ISBN: 9780323757508

Basic Immunology de A.Abbas, A. H. Lichtman, S. Pillai. Elsevier, 6th ed, (2019) eBook ISBN: 9780323639095

The immune system by P. Parham. Ltd/Garland Science, NY & London, 5th ed (2021). ISBN-13: 978-0393533378

Roitt's Essential Immunology by [Peter Delves](#), [Seamus Martin](#), [Dennis Burton](#), [Ivan Roitt](#), Wiley-Blackwell Ed., 13th ed (2017) ISBN: 978-1-118-41577-1

Books in Spanish or Catalan:

Inmunología de Kuby. J Owen, J Punt, S Stranford, P. Jones. Mc Graw Hill, 8ª edición (2019). Serà el llibre de referència fonamental del curs.

Inmunobiología de Janeway: K Murphy, P. Travers, M. Walport. Mc Graw Hill, 9ª ed, (2016).

Inmunología Celular y Molecular de A.Abbas, A. H. Lichtman, S. Pillai. Elsevier, 9ª ed, (2018).

Inmunología Básica de A.Abbas, A. H. Lichtman, S. Pillai. Elsevier, 6ª ed, (2020).

Introducción a la Inmunología Humana de L. Faimboim, J. Geffner. Ed Medica Panamericana, 7ª ed (2011).

Inmunología, Biología y Patología del Sistema Inmunitario de JR Regueiro, C López Larrea, S González Rodríguez, E Martínez Naves. Ed Médica Panamericana, 4ª ed, 2011.

Diccionari d'immunologia de TERMCAT, Centre de Terminologia, Ed Masson, Barcelona, 2005

In addition, we have acces to the platform on digital books (<https://mirades.uab.cat/ebs/>). In the following link, you will find an infographics to facilitate findind of electronic books (<https://ddd.uab.cat/record/22492>).

Among the digital resources we higlight the course books:

[Kuby inmunología \[Recurs electrònic\]](#) / Judith A. Owen, Jenni Punt, Sharon A. Stranford ; con la colaboración de Patricia P. Jones ; traducción:Bernardo Rivera Muñoz [Owen, Judith A.](#)

[Inmunología celular y molecular \[Recurs electrònic\]](#) / Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai ; ilustraciones de David L. Baker, Alexandra Baker [Abbas, Abul K.](#)

[Roitt inmunología \[Recurs electrònic\] : fundamentos](#) / Peter J. Delves ... [et al.]

[Introducción a la inmunología humana \[Recurs electrònic\]](#) / Leonardo Fainboim, Jorge Geffner [Fainboim, Leonardo](#)

Software

Not necessary

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	331	Spanish	first semester	morning-mixed
(PAUL) Classroom practices	332	Spanish	first semester	morning-mixed
(TE) Theory	33	Spanish	first semester	morning-mixed

PROVISIONAL