

Degree	Type	Year	Semester
2500502 Microbiology	OT	4	0

## Contact

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## Use of languages

Principal working language: english (eng)  
Some groups entirely in English: Yes  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

## Teachers

Mercè Martí Ripoll  
Julian Miguel Blanco Arbues  
Javier Martinez Picado  
Christian Brander Silva  
Pere Joan Cardona Iglesias  
Laila Darwich Soliva

## External teachers

Alfred Cortés  
Aura Muntasell Castellví  
Carlota Dobaño  
Hernando del Portillo

## Prerequisites

To access the study of "Immunology of Infectious Diseases", the student must have attained the learning skills of Immunology in the course corresponding to their degree.

## Objectives and Contextualisation

### SECTION I

#### Revision of the main aspects of innate and adaptive immune response

MALT: Mucosa-Associated Lymphoid Tissue

MALT: Morphological and anatomical description. Lymphocyte recirculation

Immune response in the MALT: mechanisms of innate and adaptive immunity.

## **SECTION II**

### **Immune response to bacteria**

Analysis of antibacterial mechanisms mediated by innate and adaptive immunity.

Immune effector mechanisms operating against intra or extracellular bacteria.

Evasion mechanisms that bacteria use to avoid the immune system.

### **Pathology and treatment of diseases caused by bacterial infections**

Learning to recognize and describe diseases caused by bacterial infections that are clinically important.

Identification of emerging bacterial diseases.

Vaccines.

### **Seminars by specialists**

## **SECTION III**

### **Immune response to parasites**

Learning the basics of parasitic infections.

Immune mechanisms used to deal with different types of parasitic infections.

Different strategies and different mechanisms used by parasites to evade the host's immune response.

### **Pathology and treatment of diseases caused by parasites**

Learning to recognize and describe diseases caused by parasitic infections that are clinically important.

Vaccines.

### **Seminars by specialists**

## **SECTION IV**

### **Immune response to viruses**

#### **Basic concepts of antiviral immunity.**

Specific mechanisms of innate and adaptive immunity involved in defense against viral infections.

Different strategies used by viruses to evade the antiviral immune response.

#### **Pathology and treatment of diseases caused by infections**

Learning to recognize and describe diseases caused by infections that are clinically important.

Identification of emerging viral diseases.

Vaccines.

### **Seminars by specialists**

## **Skills**

- Characterise the causal agents of microbial diseases in humans, animals and plants in order to diagnose and control them, perform epidemiological studies and be aware of present-day problems with these diseases and strategies to combat them.
- 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**

1. 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.
2. Obtain, select and manage information.
3. Understand the relationships between a possible pathogen and its host
4. Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.
5. Work individually or in groups, in multidisciplinary teams and in an international context.

## **Content**

### **Section I**

Review innate and adaptive immunity: inflamasoma, TLR signaling, cell lineages Th cells (Th1, Th2, Th17, regulatory T cells)

MALT anatomy of mucosal lymphocyte recirculation, a description of cellular elements (intraepithelial lymphocytes) and humoral (IgA) and immune response associated with MALT.

### **Section II.**

Immune response to bacteria.

Pathology of diseases caused by bacterial infections.

Seminars include three monographic sessions on *Mycobacterium tuberculosis*.

### **Section III.**

Immune response to the parasite.

Pathology of diseases caused by parasites.

Seminars include three monographic sessions on *Plasmodium falciparum*.

## Section IV.

Immune response to the virus.

Pathology of diseases caused by viral infections.

Seminars include three monographic sessions on the HIV virus.

## Methodology

Lectures:

The subjects of teaching units will be taught in 30 sessions. Some will be taught by guest lecturers and specialists in the field of clinical research in diseases caused by pathogens. The content of the theory program will be taught by teachers mainly in the form of lectures with visual support. The presentations used in class by the teacher will be available prior to the Virtual Campus.

In the seminars given by guest lecturers, the teaching language will be Catalan, Spanish or English, depending on the preference of the speaker.

SELF-LEARNING:

The autonomous learning is based on achieving specific learning skills that will accompany the start of each block. It is advised that students consult regularly the recommended books in the reference section of this guide teachers to consolidate and clarify, if necessary, the contents explained in class. In this sense it is also recommended that students use the links listed on the Virtual Campus, which contain videos and animations related to the processes explained in class.

COOPERATIVE LEARNING:

Scheduled sessions of problem-based learning (PBL). To solve problems a methodology of cooperative learning will be applied: they make groups of 3 or 4 students. Case information will be posted on the Virtual Campus (CV). The resolution of cases will target students seeking general, analyze and synthesize information on the disease that causes the immune response that develops mechanisms evasion, diagnosis and treatment for a particular microorganism. For the implementation and development of the case, students must:

- 1) Prepare a written work that consists of parts: Introduction and current state of the subject, objectives, development of information gathering, discussion and conclusions.
- 2) Prepare an oral presentation: choosing the key parts of the work and expose it to the rest of the class in an exhibition of 12 minutes questions for each group. They assessed positively the students to make oral presentations and slides in English.
- 3) Prepare an individual portfolio that includes a summary of their job within the group to develop cooperative work presented (written work and oral presentation) and reflections about their learning process in order to demonstrate their progress over time in achieving competences.

## Activities

Title	Hours	ECTS	Learning outcomes
<b>Type: Directed</b>			
Classroom practicals	12	0.48	1, 3, 2, 5, 4
Master classes	30	1.2	1, 3

<b>Type: Supervised</b>				
Collective work report by each of the team members	1	0.04	2, 5, 4	
Preparation of oral presentation	15	0.6	1, 3, 2, 5, 4	
Preparation of written report	16.5	0.66	1, 3, 2, 5, 4	
<b>Type: Autonomous</b>				
Data interpretation from an article or a problem	20	0.8	1, 3, 2, 5, 4	
Learning consolidation	50	2	1, 3, 2, 5, 4	

## Evaluation

The evaluation of the course will be continued through individual tests that assess:

- Individual learning by students from exams
- Cooperative learning from the training activities scheduled as classroom practices, written and oral presentation skills.

Evaluation activities planned in the course of Immunology are:

Exams: two partial exams. Each test will be worth 35% of the final grade. Exams will be multiple choice questions 25-30 with five options and only one correct. To be assessed a student must have answered 70% of questions. A correction value will be subtracted 1/5 per wrong answer for each question. To pass this part of the course, the sum of the partial exams must be greater than 50% by weight of the total grade (greater than or equal to 3.5 points). Students must achieve a minimum 40% in one of the exams to compensate with the other exam.

Cases (ABP): The cases are for cooperative work in groups of 3-4 students. They will be practical problems. The aim is for students to develop their skills of self-learning search and selection of information and eventually develop the ability to synthesize and written communication. Also workgroup.

The evaluation of cases represent 30% of the final grade in the course as follows:

- i) 10% for the written work.
- ii) 20% oral presentation.

To pass this part of the course grades must be greater than 50% their total value (greater than or equal to 1.5).

The final grade for the course will be composed of the score of the two partial exams (> 3.5) and cases (> 1.5).

If they fail to pass the course or want to improve grades, students can do a final full or partial exam

## Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Final Examination	70%	2	0.08	1, 3, 2
Oral presentation of team work	10%	0.5	0.02	1, 3, 2, 5, 4
Partial Examination 1	35%	1.5	0.06	1, 3, 2

Partial Examination 2	35%	1.5	0.06	1, 3, 2
Written Report	20%	0	0	

## Bibliography

- Books in English:

**Primer to the Immune Response**, 2nd Edition, by Tak W. Mak, Mary Saunders and Bradley Jett. ELSEVIER

**Review of Medical Microbiology and Immunology** by W. Levinson. Mc Graw Hill, 11e, (2010).

Deja Review **Microbiology & Immunology**, by E. Chen, S. Kasturi, McGraw-Hill Ed. 2nd ed (2010).

Elsevier's Integrated Review **Immunology and Microbiology**: With STUDENT CONSULT Online Access, by Jeffrey K. Actor - Elsevier Science Health Science Division (2011)

**BRS Microbiology and Immunology**, by Arthur G. Johnson, Richard J. Ziegler, Louise Hawley - Lippincott Williams & Wilkins (2009).

**Janeway's Immunobiology** by K Murphy. Ltd/Garland Science, NY & London, 8th ed (2011)

**Kuby Immunology** (with web support) by T.J. Kindt, R.A. Goldsby, B.A. Osborne. W.H. Freeman Co., 6th ed (2006)

**Cellular and Molecular Immunology** by Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai, Saunders, 7th ed (2011).

**Immunology**, by David K. Male, Jonathan Brostoff, Ivan Maurice Roitt, David B. Roth Mosby Elsevier Ed., 7th ed (2006)

**Roitt's Essential Immunology**, by [Peter Delves](#), [Seamus Martin](#), [Dennis Burton](#), [Ivan Roitt](#), Wiley-Blackwell Ed., 12th ed (2011)

**Principles of Mucosal Immunology** (Society for Mucosal Immunology), by Phillip D. Smith, Thomas T. McDonald, Richard S. Blumberg Ed. Garland Science 1st ed. (2013).

**Mim's Pathogenesis of Infectious disease**. A.A; Nash, R.G. Dalziel & J. R. Fitzgerald. Academic Press Ed. 6th Edition. (2015)

**Principles of Molecular Virology**. A.J Cann. Academic Press Ed. 6th Edition. (2016)

- Books in Catalan or in Spanish:

**Microbiología e inmunología médicas** de W. Levinson. Mc Graw Hill interamericana, 8<sup>a</sup> ed, (2006).

**Inmunobiología de Janeway**: K Murphy, P. Travers, M. Walport, Mc Graw Hill, 7<sup>a</sup> ed, (2008).

**Inmunología Celular y Molecular** de A. Abbas, W. Lichtman, S. Pillai. W. B. Saunders Co., Philadelphia, 7<sup>a</sup> ed, (2012).

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

**Inmunología de Kuby** by T.J. Kindt, R.A. Goldsby, B.A. Osborne. Mc Graw Hill 6<sup>a</sup> ed., (2007).

**Inmunología** de P. Parham. Ed. Panamericana, 2<sup>a</sup> ed. (2006).

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

• **Complementary Bibliography**

Advances in Immunology

[http://www.elsevier.com/wps/find/bookdescription.cws\\_home/716912/description#description](http://www.elsevier.com/wps/find/bookdescription.cws_home/716912/description#description)

<http://www.sciencedirect.com/science/bookseries/00652776>

Annual Review of Immunology

<http://arjournals.annualreviews.org/loi/immunol>

Current Opinion in Immunology

[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/601305/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/601305/description#description)

<http://www.sciencedirect.com/science/journal/09527915>

Immunological Reviews

<http://www3.interscience.wiley.com/journal/118503650/home>

Nature Reviews in Immunology

<http://www.nature.com/nri/index.html>

Seminars in Immunology

[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/622945/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/622945/description#description)

Trends in Immunology

<http://www.cell.com/trends/immunology/>

Microbiology and Immunology

<http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291348-0421>

Journal of Microbiology, Immunology and Infection

<http://www.e-jmii.com/>

Comparative Immunology, Microbiology and Infectious Diseases

[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/496/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/496/description#description)