

**Immunology of Infectious Diseases**

Code: 100756  
ECTS Credits: 6

| Degree          | Type | Year | Semester |
|-----------------|------|------|----------|
| 2500250 Biology | OT   | 4    | 1        |

**Contact**

Name: Roger Colobran Oriol  
Email: roger.colobran@uab.cat

**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**

Julian Miguel Blanco Arbues  
Javier Martinez Picado  
Christian Brander Silva  
Pere Joan Cardona Iglesias  
Roger Colobran Oriol  
Jesús Aranda Rodriguez

**External teachers**

Alfred Cortés  
Carlota Dobaño  
Esteban Veiga Chacón  
Hernando del Portillo

**Prerequisites**

To access to study "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**

Review 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

## Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Be able to analyse and synthesise
- Carry out functional tests and determine, assess and interpret vital parameters.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Obtain information, design experiments and interpret biological results.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- 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.

## Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Analyse the sex- or gender-based inequalities and the gender biases present in one's own area of knowledge.
3. Be able to analyse and synthesise.
4. Critically analyse the principles, values and procedures that govern the exercise of the profession.
5. Design and perform immune-system molecular and cellular experiments, both on basic aspects and on applications to infectious or immune-system diseases, and interpret the findings.
6. Interpret and correlate essential parameters both in normal situations and in response to infections or immune-system pathologies.
7. Propose new methods or well-founded alternative solutions.
8. Propose projects and actions that incorporate the gender perspective.
9. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
10. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
11. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
12. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

13. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
14. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

## **Content**

Contents of the subject:

### Section I

Review innate and adaptive immunity: inflammasoma, 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 a monographic session on Mycobacterium tuberculosis.*

### Section III.

Immune response to the parasite.

Pathology of diseases caused by parasites.

*Seminars include a monographic session on Plasmodium falciparum.*

### Section IV.

Immune response to the virus.

Pathology of diseases caused by viral infections.

Seminars include a monographic session on HIV.

## **Methodology**

Teaching methodology of the subject:

### LECTURES:

The topics of the Teaching Units will be taught in 30 sessions. Some of the sessions will be taught by guest professors and specialists in the field of clinical research into diseases caused by pathogens. The content of the theory program will be taught mainly by teachers in the form of master classes with audiovisual support. The presentations used in class by the teacher will be previously available in the Virtual Campus of the subject.

### SELF-LEARNING:

Autonomous learning will be based on achieving the specific learning competencies that will accompany the

beginning of each Block into which the subject program is divided. It is advisable that students regularly consult the books recommended in the Bibliography section of this teaching guide to consolidate and clarify, if necessary, the contents explained in class. In this sense, it is also advisable for students to use the links indicated on the Virtual Campus, which contain videos and animations related to the processes explained in class.

#### COOPERATIVE LEARNING:

Problem-based learning (ABP) or CASE sessions will be scheduled. To solve the cases, the cooperative learning methodology will be applied: groups of 3 or 4 students will be made. Case information will be posted on the Virtual Campus (CV).

1) Prepare an oral presentation: choose the fundamental parts of the work and present it to the rest of the class.

2) Linked to the oral presentation, there will be an infographic accompanied by a descriptive summary of it.

The details of the work will be given during the presentation of the subject.

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.

### Activities

| Title  | Hours | ECTS | Learning Outcomes          |
|--|-------|------|----------------------------|
| Type: Directed   |       |      |                            |
| Classroom practicals   | 12    | 0.48 | 5, 6, 3                    |
| Lectures   | 30    | 1.2  | 5, 6, 3                    |
| Type: Supervised   |       |      |                            |
| Preparation of oral presentation   | 16.5  | 0.66 | 5, 6, 3                    |
| Preparation of written report  | 15    | 0.6  | 5, 6, 3                    |
| Type: Autonomous   |       |      |                            |
| Interpretation of data from a scientific publication or from a clinical case | 20    | 0.8  | 14, 4, 2, 1, 5, 6, 7, 8, 3 |
| Learning consolidation: study  | 50    | 2    | 5, 6, 3                    |

### Assessment

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.

The evaluation activities scheduled in the subject of Immunology are:

Exams: two partial exams. Each test will be worth 35% of the final grade. Exams will be multiple choice questions of a minim of 25 questions with five options and only one correct. A correction value of 1/5 will be

subtracted per every incorrect answer. To pass this part of the course, the sum of the partial exams must be more than 50% weight of the total grade. Students must achieve a minimum 40% in partial 1 to compensate with partial 2.

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 writtenwork.
- ii) 20% oral presentation.

To pass this part of the course grades must be greater than 50% of their total value.

The final grade for the course will be composed of the score of the two partial exams and cases.

Along the semester, there will be questionnaires online or in class that will serve as continuous evaluation and can help the final scores.

If they fail to pass the course or want to improve grades, students can retake a full or partial final exam. By doing an exam to improve grades, the student renounces to the previous score obtained.

Failure to appear to any of the tests must be justifiedto get a second chance.

To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course. Thus, the student will be graded as Non-evaluable if the weighing of all conducted evaluation activities is less than 67% of the final score.

## Assessment Activities

| Title                                | Weighting | Hours | ECTS | Learning Outcomes                             |
|--------------------------------------|-----------|-------|------|---|
| Final Examination                    | 70%       | 2     | 0.08 | 5, 6, 3                                       |
| Oral presentation of collective work | 10%       | 0.5   | 0.02 | 5, 6, 13, 10, 3                               |
| Partial Examination P1               | 35%       | 1.5   | 0.06 | 5, 6, 3                                       |
| Partial Examination P2               | 35%       | 1.5   | 0.06 | 5, 6, 3                                       |
| Written report                       | 20%       | 1     | 0.04 | 14, 4, 2, 1, 5, 6, 7, 8, 13, 12, 11, 9, 10, 3 |

## Bibliography

Primer to the Immune Response, 2nd Edition, by Tak W. Mak, Mary Saunders and Bradley Jett. 2n Edition, ELSEVIER (2014). ISBN: 9780123852458

Review of Medical Microbiology and Immunology by W. Levinson, P. Chin-Hong, E.A. Joyce, J. Nussbaum, B. Schwartz. McGraw-Hill, 16th edition, (2020). ISBN-13: 978-1260116717.

Deja Review Microbiology and Immunology. E. Chen, S. Kasturi. McGraw-Hill Ed. 2nd ed (2010). ISBN-13: 978-0071627153.

Elsevier's Integrated Review Immunology and Microbiology: With STUDENT CONSULT Online Access, by Jeffrey K. Actor - Elsevier Science Health Science Division (2012). ISBN: 978-0323074476.

BRS Microbiology and Immunology, by Arthur G. Johnson, Richard J. Ziegler, Louise Hawley. Lippincott Williams & Wilkins 5th (2009). ISBN: 9780781789127.

Janeway's Immunobiology by K. Murphy, C. Weaver. Ltd/Garland Science, NY & London, 9th ed (2016). ISBN: 9780815345053.

Kuby Immunology (with web support) by J. Punt, S. Stranford, P Jones and J. Owen. W.H. Freeman and Co. Ltd, 8th ed (2018). ISBN13: 9781319114701

Cellular and Molecular Immunology by Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai, Saunders, 10th ed (2021). ISBN13: 978-0323757485.

Roitt's Essential Immunology, by [Peter Delves](#), [Seamus Martin](#), [Dennis Burton](#), [Ivan Roitt](#), Wiley-Blackwell Ed., 13th ed (2017). ISBN 9781118415771.

Principles of Mucosal Immunology (Society for Mucosal Immunology), by Phillip D. Smith, Thomas T. McDonald, Richard S. Blumberg Ed. Garland Science 2nd ed. (2020). ISBN 9780815345558.

Mim's Pathogenesis of Infectious disease. A.A; Nash, R.G. Dalziel & J. R. Fitzgerald. Academic Press Ed. 6th Edition. (2015). EBook ISBN: 978012397781; Paperback ISBN: 9780123971883

Principles of Molecular Virology. A.J Cann. Academic Press Ed. 6th Edition. (2016). EBook ISBN: 9780128019559; Paperback ISBN: 9780128019467.

Unifying Microbial Mechanisms. M. F. Cole. Garland Science 1st ed. (2019). eBook ISBN: 9780429262777.

- 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)

## **Software**

Microsoft Office is sufficient to carry out this subject.