UAB
Universitat Autònoma de Barcelona

Immunology of Infectious Diseases

Code: 101007
ECTS Credits: 6

2025/2026

Degree	Type	Year
Microbiology	OP	4

Contact

Name: Roger Colobran Oriol

Email: roger.colobran@uab.cat

Teachers

Julian Miguel Blanco Arbues

Javier Martinez Picado

Christian Brander Silva

Pere Joan Cardona Iglesias

Roger Colobran Oriol

Jesus Aranda Rodriguez

(External) Alfred Cortés

(External) Carlota Dobaño

(External) Esteban Veiga Chacón

(External) Hernando del Portillo

Teaching groups languages

You can view this information at the end of this document.

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

BLOCK 1

1.1 Overview of the immune response.

-Review of the main aspects of innate and adaptive immune response.

-Review and deepening of the mucosal-associated immune system (MALT).

BLOCK 2

2.1 Immune response to viruses.

-To understand the central concepts related to antiviral immunity.

-Identify and characterize the mechanisms of innate and adaptive immunity involved in the defense against viral infections.

2.2 Inborn errors of immunity (primary immunodeficiencies) that cause severe viral infections.

-To know the genetic defects affecting molecules of the immune system that are key to the defense against viruses.

-To relate the consequences of these genetic defects with concepts explained in the part of immune response to viruses.

2.3 Seminars by specialists.

BLOCK 3

3.1 Immune response to bacteria.

-To understand the central concepts related to antibacterial immunity.

-Identify and characterize the mechanisms of innate and adaptive immunity involved in the defense against bacterial infections.

-To differentiate between the immune response to intracellular and extracellular bacteria.

3.2 Inborn errors of immunity (primary immunodeficiencies) that cause severe bacterial infections.

-To know the genetic defects affecting molecules of the immune system that are key to defense against bacteria.

-To relate the consequences of these genetic defects with concepts explained in the part of immune response to bacteria.

3.3 Seminars by specialists.

BLOCK 4

4.1 Immune response to fungi.

-To understand the central concepts related to antifungal immunity.

-Identify and characterize the mechanisms of innate and adaptive immunity involved in the defense against fungal infection.

4.2 Inborn errors of immunity (primary immunodeficiencies) that cause severe fungal infections.

-To know the genetic defects affecting molecules of the immune system that are key to defense against fungi.

-To relate the consequences of these genetic defects to concepts explained in the part on immune response to fungi.

BLOCK 5

5.1 Immune response to parasites.

-To understand the central concepts related to immunity against parasites.

-To identify and characterize the mechanisms of innate and adaptive immunity involved in the defense against parasitic infections.

5.2 Seminars by specialists.

Learning Outcomes

1. CM13 (Competence) Plan diagnostic and control strategies for infectious diseases from a global perspective and integrating clinical and epidemiological data to provide innovative responses to the challenges, needs and demands of society.
2. CM14 (Competence) Integrate knowledge and skills in the field of microbiology applied to health, working individually and in groups, to prepare and present in writing or orally and publicly a scientific work either in English or in one's own language or others.
3. KM19 (Knowledge) Identify the cellular and molecular relationships established between a microorganism or parasite and its host, including physiological and pathological mechanisms of defence and host response.
4. KM21 (Knowledge) Indicate the main measures for the prevention and control of pathogenic microorganisms.
5. SM19 (Skill) Use bibliography or internet tools, both in English and in one's own language or others, for the study of pathogenic microorganisms and their control.
6. SM20 (Skill) Apply appropriate methods for the identification, diagnosis and control of microbial agents and their genetic or metabolic components in clinical samples or food.

Content

BLOCK 1

1.1 Overview of the immune response.

-Overview of innate immune response: cells of innate immunity, PRRs, PAMPs, DAMPs, complement system, natural killer cells, epithelial barriers, the inflammatory response, the antiviral response.

-Overview of adaptive immune response: Antigen presentation to T lymphocytes, B-cell response, T-cell dependent antibody response, T-cell independent B cell response, T cell response, T cell activation, differentiation and functions of CD4+ effector T cells, differentiation and functions of CD8+ effector T cells.

-Overview of mucosal immunology (MALT): MALT, structure of GALT, small vs large intestine, lamina propria, peyer patches, M cells, innate immunity in GALT, adaptive immunity in GALT, lymphocyte homing in GALT, humoral response in GALT (IgA), T cell response in GALT.

BLOCK 2

2.1 Immune response to viruses.

-General characteristics of virus, tropism, kinetics of immune response to viral infections, innate immunity against virus, viral danger signals, virus recognition by innate immunity, type-I interferons, the antiviral response, plasmacytoid dendrític cells, natural killer cells.

-Adaptive antiviral immune response: humoral response, antibodies, kinetics of antibody response in viral infection, antibody-dependent enhancement, T-cell response against virus, cross-presentation, cytotoxicity, inhibitory mechanisms, T-cell exhaustion, memory cells.

2.2 Inborn errors of immunity (IEI, also known as primary immunodeficiencies) that cause severe viral infections.

-TLR3 deficiency underlying herpes simplex encephalitis, RNA polymerase III (Pol III) deficiency underlying severe varicella zoster infection, IEI predisposing to EBV infection, IEI underlying severe papillomavirus infections, IEI predisposing to severe influenza virus infections.

2.3 Seminars by specialists.

BLOCK 3

3.1 Immune response to bacteria.

-Immune response to extracellular bacteria: General concepts about bacteria, innate immune response to extracellular bacteria: TLRs, NLRs, inflammasome and pyroptosis, role of phagocytes, neutrophils and NETs. Adaptive immune response to extracellular bacteria: humoral immune response, cellular immune response (CD4 T cells, Th17 cells), pathological consequences of immune responses to extracellular bacteria.

-Immune response to intracellular bacteria: Clinical characteristics of infections with intracellular bacteria, innate immune response: autophagy, inflammasome, role of interferons, NK cells. Adaptive immune response: development and functions of Th1 cells, role of Th17 cells, role of CD8 T cells; granulomas (formation, structure, composition, dynamics).

3.2 Inborn errors of immunity (primary immunodeficiencies) that cause severe bacterial infections.

-Inborn errors of Immunity (IEI) predisposing to extracellular bacterial infections: IRAK4 and MYD88 deficiencies underlying pyogenic bacterial infections. RPSA deficiency causing isolated congenital asplenia and infections. IEI of IL6 receptor and severe bacterial infections. IEI of the complement system and extracellular bacterial infections.

-Inborn errors of Immunity (IEI) predisposing to intracellular bacterial infections: Mendelian susceptibility to mycobacterial disease (MSMD): impairment of IFN-gamma production or response, IL12R deficiency, IL23R deficiency, other defects.

3.3 Seminars by specialists.

BLOCK 4

4.1 Immune response to fungi.

- Mycobioma, fungal infections in humans, fungi PAMPs, detecting fungi by PRRs (c-type lectin receptors), innate immunity (macrophages and DCs), cellular adaptive immune response against fungal infections (role of Th17 cells), humoral adaptive immunity in fungal infections.

4.2 Inborn errors of immunity (primary immunodeficiencies) that cause severe fungal infections.

- CARD9 deficiency and severe fungal infections, IL17-IL17R deficiencies and chronic mucocutaneous candidiasis (CMC), AIRE deficiency and CMC, STAT1 gain-of-function mutations and CMC.

BLOCK 5

5.1 Immune response to parasites.

-General aspects of the immune response to parasites. Immune response to helminths: ILC2 cells, stromal cells and type 2 cytokines (TSLP, IL25, IL33), Th2 cells (IL4, IL13, IL5), eosinophils, basophils, mast cells and M2 macrophages, B cell response (IgE) and mast cells.

5.2 Seminars by specialists.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom practicals	12	0.48	KM19, SM19, KM19
Master classes	30	1.2	CM13, KM19, KM21, SM20, CM13
Type: Supervised			
Preparation of oral presentation	17	0.68	CM14, SM19, CM14
Preparation of written report	17	0.68	CM14, SM19, CM14
Type: Autonomous			
Data interpretation from an article or a problem	20	0.8	SM19, SM20, SM19
Learning consolidation: study	50	2	KM19, SM19, KM19

Teaching methodology of the course

LECTURES:

The topics of the different blocks will be taught in approximately 30 sessions. Some of the sessions will be given by guest lecturers and specialists in the field of clinical research of diseases caused by pathogens. The content of the theory program will be taught by the professor responsible for the course in the form of lectures with audiovisual support. The presentations used in class by the professor will be previously available in the Virtual Campus of the subject.

AUTONOMOUS LEARNING:

Autonomous learning will be based on achieving the specific learning competencies that will accompany the beginning of each block in which the program of the subject is divided. Students are advised to regularly consult the books recommended in the bibliography section of this teaching guide to consolidate and clarify, if necessary, the contents explained in class.

COOPERATIVE LEARNING:

Cooperative learning sessions will be scheduled: groups of students will be made to work on a specific topic. The tasks of each group will be:

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

2) Linked to the oral presentation, an infographic will be made together with a descriptive summary of the same.

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

Attendance at cooperative learning (PA) sessions is mandatory. There will be a maximum of 10 PA sessions during the course. Attendance will be monitored. A maximum of two absences will be allowed, provided they are justified (supporting documentation will be required).

CLASS ATTENDANCE:

This course is a face-to-face course. This means that it is designed for students to attend all classes in person. Attending class facilitates understanding of the content and helps students discern which information from the support slides is essential and which is supplementary.

However, attendance will not be monitored during the lecture sessions. Therefore, strictly speaking, attendance is not mandatory, but it is highly recommended.

As previously explained, attendance at PA (cooperative learning) sessions is mandatory.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Partial Examination 1	35%	1.5	0.06	CM13, KM19, KM21, SM20
Partial Examination 2	35%	1.5	0.06	CM13, KM19, KM21, SM20
Presentation of team work	30%	1	0.04	CM14, SM19

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

-The individual learning of the student from partial exams.

-The cooperative learning from the formative activities programmed in the classroom practices, written and oral presentation of a pathogen following the competences of the subject.

The evaluation activities programmed in the subject of Immunology are:

Midterm (partial) exams: two midterm exams. Each test will count 35% of the final grade (70% of the final grade between both midterm exams). They will be multiple-choice exams of at least 30 questions with 5 options and only one correct one. In the correction, 1/5 of the value of each question will be subtracted for an incorrect answer. To pass this part of the course, the average grade of the two midterm exams must be equal or higher than 5. Students must achieve a minimum grade of 4 in the midterm exams in order to average them.

Cooperative learning: It is proposed as cooperative work in groups of 3-6 students. The objective is that students develop their self-learning skills, search and selection of information and finally develop the ability to synthesize and written communication. The ability to work in groups is also valued.

The evaluation of cooperative learning will represent 30% of the final grade of the course. For the grade of the group work, the content of the work, format, oral presentation and subsequent discussion will be evaluated.

In order to pass this part of the course, the grade for the cooperative learning will be equal or higher than 5.

The final grade of the subject will be composed by the score obtained from the two partial (70% of the grade) plus the score of the cooperative learning work (30% of the grade).

REMARKS:

-In case of not passing any of the midterm exams or if the student wants to raise the grade, he/she will have the option of taking a final exam that is composed by midterm exams (i.e. the student has the option of taking only one of the midterms or both, as appropriate). The format of the make-up exam may be multiple-choice and/or short questions. The format of the make-up exam will be announced in advance.

-Students who wish to raise their grade lose their previous grade.

-Failure to attend any of the exams must be justified. Failure to attend any of the midterm exams (regardless of the reason, even if justified) implies that the student will have to retake that midterm exam during the final exam/recovery.

-To participate in the recovery, students must have been previously evaluated in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject. Therefore, the student will obtain the grade of Not Evaluable when the evaluation activities performed have a weight of less than 67% in the final grade.

SINGLE EVALUATION:

Students have the possibility to apply for the single evaluation. The single evaluation consists of the following:

-Students waive to take the two partial exams separately and will take a single exam (single evaluation exam) on the same date as the second partial exam is taken. This exam will have the content of the whole course and will account for 70% of the final grade. In order to pass this part of the course, the grade of the single evaluation exam must be equal or higher than a 5. The format of the single evaluation exam will be informed in advance.

-RECOVERY: The same recovery system will be applied as for the continuous evaluation.

-Students who opt for the single evaluation must also take the cooperative learning part (30% of the final grade) and will have to attend the classroom practices (which are compulsory for all students).

Bibliography

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

- Complementary Bibliography

Advances in Immunology

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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.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

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

Software

Microsoft Office is sufficient to carry out this subject.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	741	English	first semester	morning-mixed
(TE) Theory	74	English	first semester	morning-mixed