

## 27112 - Immunology

### Información del Plan Docente

<b>Academic Year</b>	2018/19
<b>Subject</b>	27112 - Immunology
<b>Faculty / School</b>	100 - Facultad de Ciencias
<b>Degree</b>	446 - Degree in Biotechnology
<b>ECTS</b>	6.0
<b>Year</b>	2
<b>Semester</b>	Second semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **1.General information**

#### **1.1.Aims of the course**

#### **1.2.Context and importance of this course in the degree**

#### **1.3.Recommendations to take this course**

### **2.Learning goals**

#### **2.1.Competences**

#### **2.2.Learning goals**

#### **2.3.Importance of learning goals**

### **3.Assessment (1st and 2nd call)**

#### **3.1.Assessment tasks (description of tasks, marking system and assessment criteria)**

### **4.Methodology, learning tasks, syllabus and resources**

#### **4.1.Methodological overview**

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

- Lectures.
- Practice sessions in laboratory.
- Solving problems sessions.

Students are expected to participate actively in class throughout the semester.

Further information regarding the course will be provided on the first day of class.

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### 4.2. Learning tasks

The course includes the following learning tasks:

- Activity 1: Acquisition of basic knowledge through participatory lectures. (3.5 ECTS). Classes will be conducted by combining the use of the blackboard and presentations of "PowerPoint". Students will have presentations before the course starts through the Digital Teaching Ring of the University. Presentations will include direct links to websites that offer educational materials related to the topic that is being exposed. In this sense, the recommended books (see below) have very appropriate websites associated.
- Activity 2: Preparation of problems and cases by students and resolution in the classroom. (1 ECTS). Problems and exercises will be available the course starts in the Digital Teaching Ring.
- Activity 3. Practice sessions in the laboratory. (1.5 ECTS). The internship program will be carried out intensively to be completed in four consecutive days. The sessions are scheduled four sessions of 4 hours each.

### 4.3. Syllabus

The course will address the following topics:

#### SECTION I. INTRODUCTION

- 1. General properties of the immune system. innate and acquired immunity.
- 2. Cells of the immune system.
- 3. Tissues of the immune system.

#### SECTION II. ANTIBODIES. IMMUNOCHEMISTRY

- 4. Antigens and immunogens. immunogenicity
- 5. Antibodies. I. Classes of immunoglobulins and structure.
- 6. Antibodies. II. Antibody production. Polyclonal antibodies. Adjuvants. Hybridomas. Production of monoclonal antibodies.
- 7. Antibodies. III. Applications of antibodies. Immunochemistry methods.
- 8. Generation of the diversity of antibodies

#### SECTION III. CELL-MEDIATED IMMUNITY

- 9. The T cell receptor (TCR).
- 10. The major histocompatibility complex (MHC).
- 11. Antigen presentation to T cells.
- 12. Signal transduction pathways in the activation of T cells.

#### SECTION IV. EFFECTOR MECHANISMS OF THE IMMUNE SYSTEM

- 13. Cytokines and their receptors.
- 14. B Cell activation
- 15. The complement system.
- 16. Action of the cytotoxic lymphocytes (CTL and NK).

#### SECTION V. ONTOGENY, REGULATION AND INTEGRATION OF THE IMMUNE SYSTEM

- 17. Ontogeny of the immune system. Central tolerance.
- 18. Regulation and integration of the immune response. Peripheral tolerance.

### 4.4. Course planning and calendar

Schedules of lectures and problems will coincide with the officially established and will be available at: <https://ciencias.unizar.es/grado-en-biotecnologia>.

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The places, calendar and groups for training and practical sessions will be established in coordination with the rest of the subjects at beginning of course. The Coordinator will produce the groups of students for these activities at beginning of course to avoid overlaps with other subjects.

For the classes of problems the class will be divided into two groups.

Practical sessions will be conducted in sessions of four hours from 9 am to 13 pm. The practices will take place in the laboratory of the Department of Biochemistry. Groups of 15 students each will be organized. The specific date of implementation of practices will be announced in the ADD and the bulletin board of the Degree in Biotechnology.

For students enrolled in the subject, places, times and dates of lectures and practical sessions will be public via Bulletin Board advertisements of the grade on the platform Moodle at the University of Zaragoza, <https://moodle2.unizar.es/add/>, and in the moodle page for the course. These routes will be also used to communicate enrolled students their distribution by groups of practical sessions, which will be organized by the coordination of degree. Provisional dates will be available on the website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: <https://ciencias.unizar.es/grado-en-biotecnologia>.

In this web there will be also available the dates of exams.

### 4.5. Bibliography and recommended resources