

## 27112 - Immunology

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	100 - Facultad de Ciencias
<b>Degree</b>	446 - Degree in Biotechnology
<b>ECTS</b>	6.0
<b>Course</b>	2
<b>Period</b>	Second semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **1.Basic info**

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

#### **1.2.Activities and key dates for the course**

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.

### **2.Initiation**

#### **2.1.Learning outcomes that define the subject**

#### **2.2.Introduction**

#### **3.Context and competences**

##### **3.1.Goals**

##### **3.2.Context and meaning of the subject in the degree**

##### **3.3.Competences**

##### **3.4.Importance of learning outcomes**

### **4.Evaluation**

### **5.Activities and resources**

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### 5.1. General methodological presentation

The learning process that is designed for this subject is based on the following:

Training 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 "Power Point". 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.

Training 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.

Training activity type 3. Practical classes 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.

### 5.2. Learning activities

The program offered to help the student achieve the expected results includes the following activities ...

1. Training activity 1. Participatory lectures.
2. Training activity 2. Classes of problems and cases
3. Training activity 3. Practical classes in the laboratory.

### 5.3. Program

#### 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.

#### 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

#### 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.

#### 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).

#### 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.

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### 5.4.Planning and scheduling

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

The places, calendar and groups for training and practical sessions will be established in coordination with the rest of maters 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 .

### 5.5.Bibliography and recomended resources