

## 27114 - Plant Physiology

### Información del Plan Docente

<b>Academic Year</b>	2018/19
<b>Subject</b>	27114 - Plant Physiology
<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**

The course contents basic knowledge in plant physiology. It is the study of the plant processes, how plants function and how plants interact with the environment

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

This subject is taught in the second semester of the second year.

This subject will later in the fourth year, provide the basic knowledge to develop the course on Plant Biotechnology

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

It is recommended to have passed the subject of General Biology of the first year.

### **2.Learning goals**

#### **2.1.Competences**

Upon passing the subject, the student will be more competent to:

- Recognize plant structures in optical and electronic microscopy images.
- Demonstrate detailed knowledge of the physiology of different tissues and of the complete vegetable
- Manipulate plant material in the laboratory
- Assess the effect of environmental and nutritional factors on vegetables

In addition to these specific competences, the student has to improve:

- 1) The ability to observe.
- 2) The ability to solve problems.
- 3) The critical analysis of the information.
- 4) The synthesis and integration of information.
- 5) The public presentation of topics.

## 27114 - Plant Physiology

### 2.2.Learning goals

The student at the end of the course will be able to:

- identify the uniqueness of the metabolism of photosynthetic organisms, including cyanobacteria
- understands the functional aspects of all the organelles and components of plant cells
- understands the structure and function of the different types of plant tissues, as well as the basic organography
  
- Knowledge of the metabolism of vegetables, and differentiates its specific aspects with respect to other groups of living beings, including the process of photosynthesis, both the photochemical phases and the synthesis of organic compounds, with their variants. Also, the role of water and minerals in plants and the basis of water and absorption processes in the soil-plant-atmosphere system
- differentiate the types of plant hormones, their role in the development of plants and their mechanisms of action
- handle plant material in the laboratory

### 2.3.Importance of learning goals

The subject will permit students to know how a vegetable works, and therefore, to know the ability to optimize, modify, alter or take advantage of the many aspects of its development and metabolism that in the context of agriculture, the agro-food processing industry, the pharmacological industry, environmental, etc, that can implement improvements through biotechnology of photosynthetic organisms

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

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

The student must demonstrate that he/she has achieved the expected learning outcomes through the following assessment activities:

Written tests will be carried out, consisting of tests (dissertation or multiple choice test) that allow to assess the level of knowledge and skills of the students. The option to carry out an oral test is open to students who request it.

The results of the training activities consisting of seminars and practical classes can compute up to 10% of the final grade.

The syllabus that students must use to prepare the different tests can be found in the Program section of this same teaching guide.

## 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, tutorials, seminars and laboratory practices.

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.

### 4.2.Learning tasks

The course includes the following learning tasks:

## 27114 - Plant Physiology

- Lectures. With the materials incorporated in the ADD available to the student.
- Seminars: Its realization is mandatory.
- Practical classes: In laboratory practices the student will learn how to handle plant material, and study and observe aspects that have been developed in the theoretical classes.
- Tutorials: In which the students have the possibility of consulting with the teachers. The tutorials can be carried out at any time of the course, by appointment with the teacher.

All students will be informed about the risks that can occur in the lab of this subject, as well as if they handle dangerous products and what to do in case of accident, and must sign the commitment to comply with the rules of work and safety to be able perform them. For more information, consult the information for students of the Occupational Risk Prevention Unit: <http://uprl.unizar.es/estudiantes.html>.

### 4.3.Syllabus

The course will address the following topics:

1. Introduction
2. The Plant Cell and tissues
3. Plant Structure
4. Transport and Translocation of Water and Solutes
5. Mineral Nutrition
6. Gas Exchange: stomata physiology
7. Photosynthesis: light reactions
8. Photosynthesis: the carbon reactions
9. Nitrogen Metabolism: Nitrogen Assimilation
10. Nitrogen Metabolism: Biological Nitrogen Fixation
11. Growth and Development
12. Reproductive Physiology: Flowers, Seeds and Fruits
13. Growth and Development Regulators: Plant Hormones
14. Growth and Development Regulators: Environmental factors
15. Plant movements
16. Plant Stress Physiology;secondary metabolites and plant defense

### 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>.

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

## 27114 - Plant Physiology

- BB** Fundamentos de fisiología vegetal / coordinación J. Azcón M. Talón. 2ª ed. Madrid [etc.] : McGraw-Hill Interamericana Barcelona : Publicacions i Edicions UB, 2008
- BB** Raven, Peter Hamilton. Biología de las plantas / Peter H. Raven, Ray F. Evert, Susan E. Eichhorn ; versión española por Sergio Santamaría del Campo, Francisco Lloret Maya, Mª Angeles Cardona Florit . - Ed. en español Barcelona : Reverté, cop.1992
- BB** Raven, Peter Hamilton. Biología de las plantas. Vol. 2 / Peter Raven, Ray F. Evert, Susan E. Eichhorn ; versión española por Sergio Santamaría del Campo, Francisco Lloret Maya, Mª Angeles Cardona Florit . - Ed. en español Barcelona [etc.] : Reverté, cop.1992
- BB** Rudall, Paula J.. Anatomía de las plantas con flores : introducción a la estructura y al desarrollo / Paula J. Rudall ; traducción de la tercera edición en inglés de Luis Á. Inda, Manuel Pimentel, Ernesto Pérez-Collazos . - 1ª ed. Zaragoza : Pressas Universitarias de Zaragoza, 2009
- BB** Taiz, Lincoln. Fisiología vegetal / Lincoln Taiz, Eduardo Zeiger. - 4ª ed. Castelló de la Plana : Publicacions de la Universitat Jaume I, 2006
- BB** Taiz, Lincoln. Plant physiology and Development/ Lincoln Taiz, Eduardo Zeiger . - 6th ed. Sunderland : Sinauer Associates, 2014