VNIVERSITAT DE VALÈNCIA

Course Guide
33194 Plant Biotechnology

COURSE DATA

Data Subject	
Code	33194
Name	Plant Biotechnology
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1102 - Degree in Biotechnology	Faculty of Biological Sciences	4	Second term

Subject-matter

Degree	Subject-matter	Character
1102 - Degree in Biotechnology	104 - Plant biotechnology	Optional

Coordination

Name	Department
ARRILLAGA MATEOS, ISABEL	25 - Plant Biology

SUMMARY

Plant biotechnology is an optional subject in the Degree of Biotechnology. The theoretical and practical contents, together with activities that are developed during the course are designed considering two main aspects. First, provide the knowledge that students should have about Plant Biotechnology and second, to avoid overlap with other core and optional courses. In this respect, students have previously studied the following two core subjects: Plant Biology and Obtaining Transgenic Organisms. Also they might be attending an optional course on Molecular Biology of Plants, as well as other somewhat less related disciplines.

Both classical plant breeding and breeding by the use of biotechnological processes are necessary and complementary. On this basis, a first section of the lectures is dedicated to the contributions of in vitro culture of plant cells and tissue to plant breeding. This section is supplemented with the contents of the lab classes, as these subjects are taught almost exclusively in Plant Biotechnology.
The second section focuses on the comparative study of the different systems of plant genetic transformation, analyses of gene expression, and the characterization of transgenes. The content for this section, which includes a practical class, have been limited to avoid overlap with similar plant-related sections on the programs of Obtaining Transgenic Organisms and Plant Molecular Biology.

The third program section is devoted to different applications of genetic manipulation of plants, mainly in relation to tolerance to different types of biotic and abiotic stresses, synthesis of both plant products and exogenous products as well as some aspects of plant development including productivity. The program ends with brief comments on the regulation of the use of genetically modified plants and plant This section includes student debates on recent scientific and general articles.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1102 - Degree in Biotechnology

- Diseñar procesos de manipulación y obtención de productos biotecnológicos.
- Analizar a nivel molecular el resultado de la manipulación de un organismo.
- Aplicar soluciones biotecnológicas a problemas medioambientales.
- Diseñar y aplicar aproximaciones biotecnológicas en el campo de la Agroalimentación.

LEARNING OUTCOMES

First, students must learn Plant Biotechnology.

• Increase their ability to acquire information from articles and scientific texts using different sources.

• In relation to the acquired information, they should understand the real meaning of critical analysis and apply it.

• In practical classes, along with the methodology, students should learn to design experiments and analyze the obtained results.

Students are expected to expand some of the following skills:

• Debate with scientific arguments and always correctly.
• Contribute actively within the groups established for the performance of activities.
• Participate constructively in the development of classes.
• Learn to differentiate between having authority and being authoritarian.

DESCRIPTION OF CONTENTS

1. Contents

1 Plant Biotechnology: concept and applications.
2 Methodological and theoretical basis of in vitro culture of cells and tissues
3 Production of plants from somatic tissues: applications
4 Production of haploid and di-haploids
5 Genetic resources conservation systems
6 Genomic variations I. Somatic hybridization
7 Genomic variations II. Mutagenesis: types and applications
8 Genomic variations III: Genetic transformation procedures and evaluation of transgenic plants
9 Resistance to pathogens and herbivores
10 Tolerance to abiotic stresses
11 Modifications in plants and plant products
12 Synthesis of exogenous compounds: molecular farming
13 The GM crops: culture regulations

2. Laboratory classes

Laboratory classes: five sessions of 4 h each (a total of 20 h)

TITLE
Preparation and sterilization of media for different in vitro cultures
Disinfection and culture of plant material
Obtaining plants by direct morphogenesis (dicots). Cellular dedifferentiation and subsequent indirect morphogenesis (monocots)
Propagation by axillary buds and acclimation of plants obtained by in vitro
Virus-inuced gene silencing
Obtention of transgenic plants (antibiotic and herbicide selection), transpone heritability and analysis of gene expression.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Laboratory practices	20,00	100
Tutorials	2,00	100
Study and independent work	65,00	0
Preparation of evaluation activities	10,00	0
Preparation of practical classes and problem	15,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

• Attendance at lectures is not mandatory, but recommended especially when the class includes a students´ activity (see section V, and b). Attending the tutorial sessions is also strongly recommended.
• Attendance at practical classes is compulsory.

EVALUATION

The assessment is mainly done through a written test is performed at the end of the semester. The answers to the various questions related to lectures up to 70% overall rating
Related to practical classes (10%) and class room activities including seminars up to 20% of the overall grade.

REFERENCES

Basic

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Slater A, Scott NW, Fowler MR (2008). Plant Biotechnology. The genetic manipulation of plants. Oxford University Press, Oxford
Smith AM et al.(2010). Plant Biology. Garland Sciences, New York.
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ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available