Course guide
390332 - BTAP - Biotechnology for Production

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: English

LECTURER

Coordinating lecturer: Roig Villanova, Irma
Others: Roig Villanova, Irma

REQUIREMENTS

Students should have passed the subject of Molecular Biology and Biotechnological Tools (BMEBT) or equivalent.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
1. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

The teaching methodology varies depending on whether it is theoretical (large group) or practical (small group) classes.
In the theoretical classes, teachers will introduce the general topics related to the basic matter. They will try to motivate and involve the students to actively participate in their learning. Support material can be found in ATENEA.
The practical classes (Small groups) have as a main objective that students learn by doing the basic techniques applied in biotechnology.

LEARNING OBJECTIVES OF THE SUBJECT

It is intended that students acquire all the necessary knowledge and skills in those biological techniques that allow:
Learning and in some cases expanding the theoretical bases of plant tissue culture, genetic engineering and other biotechnological techniques.
Applying the technology of micropropagation of plant species, DNA extraction, PCR determination and electrophoresis technique, so that later professionally she/he could be engaged in public or private projects that involve these biotechnological techniques.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>40.0</td>
<td>26.67</td>
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<tr>
<td>Hours small group</td>
<td>20.0</td>
<td>13.33</td>
</tr>
<tr>
<td>Self study</td>
<td>90.0</td>
<td>60.00</td>
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</tbody>
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Total learning time: 150 h

CONTENTS

MICROPROPAGATION OF COMMERCIAL PLANT SPECIES AND IN VITRO CULTURE TECHNIQUES

Description:
- History of plant tissue culture
- Cell culture media
- Phases and cell culture methodology
- Production of pathogen-free plants
- Somatic embryogenesis
- Haploid production
- Protoplasts culture
- Conservation of plant material

Related activities:
- Activity 1: Theoretical classes.
- Activity 2: Individual evaluation.
- Activity 3: Laboratory training.
- Activity 4: Visit to a company.

Full-or-part-time: 60h
- Theory classes: 20h
- Laboratory classes: 10h
- Self study: 30h

BIOTECHNOLOGY APPLIED TO GENETIC ENGINEERING

Description:
- Genetic Engineering: Biotechnological methods used in genetic improvement and production. Theoretical explanations accompanied by practical examples. The classes will cover techniques related to the analysis of variability (molecular biology, bioinformatics for sequence analysis ...) as well as techniques related to the generation of new variability (transgenesis, Tilling, CRISPR / Cas9 ...). Legislation.

Related activities:
- Activity 1: Theoretical classes.
- Activity 2: Individual evaluation.
- Activity 3: Laboratory training.
- Activity 4: Visit to a company.

Full-or-part-time: 60h
- Theory classes: 20h
- Laboratory classes: 10h
- Self study: 30h
OTHER BIOTECHNOLOGY TECHNIQUES

Description:
In this section we will study different technologies and methodologies related, mainly, to applications in biotechnology.

Full-or-part-time: 30h
Self study: 30h

ACTIVITIES

ACTIVITAT 1: THEORETICAL LECTURES

Description:
The teachers, by using all the methods available in the classroom, expose the general knowledge related to the basic concepts of the subject. In half of the cases the sessions last two hours. Therefore it is necessary to seek motivation and participation involving students in actively participating in their learning. The subject is a topical and changing issue, not free from controversy, ethics and/or morality, which in no case should be avoided.

Material:
All material available in the classroom, such as computer connected to projector, Internet connection, audiovisual material, blackboard, etc.

Full-or-part-time: 80h
Theory classes: 40h
Self study: 40h

ACTIVITY 3: LABORATORI PRACTICES

Description:
There will be 8 sessions of laboratory practices. 4 of them will be related to in vitro culture and other 4 will be related to molecular genetics.

Specific objectives:
To learn applied biotechnology techniques. At the end of the activity, the student will be able to know the factors involved in plant tissue culture, and to know how to perform and interpret a PCR and characterize the conditions in which they have carried out the practices.

Material:

Full-or-part-time: 40h
Laboratory classes: 20h
Self study: 20h
**ACTIVITAT 2: INDIVIDUAL EVALUATIONS**

**Description:**
The evaluation will be related to the theoretical and practical contents. The capacities of the students to learn by themselves will be also evaluated.

**Specific objectives:**
Assessment of the achievement of the learning objectives of the theoretical and practical contents of the subject.

**Full-or-part-time:** 4h
Theory classes: 4h

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**ACTIVITY 4: VISITA A UNA EMPRESA DEL SECTOR**

**Description:**
A private company will be visited where biotechnology is routinely applied in plant production and improvement.

**Specific objectives:**
The aim is for students to observe first hand one of the techniques and applications that have emerged from "in vitro" culture systems or micropropagation.

**Delivery:**
The evaluation of this visit will be included in the evaluation questionnaires of the subject.

**Full-or-part-time:** 14h
Laboratory classes: 4h
Self study: 10h

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**ACTIVITY 5: PRESENTATION OF AN ARTICLE / PROJECT**

**Description:**
Students will have to present an article or research project related to biotechnology

**Specific objectives:**
Learning to communicate science to an expert audience

**Material:**
powerpoint presentation

**Full-or-part-time:** 30h
Self study: 30h

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**GRADING SYSTEM**

N1: Qualification of the examination of half term
N2: Qualification of the end-of-term exam
N3: Qualification of practical training
N4: Qualification of the article / project

Final grade: 0.35 N1 + 0.35 N2 + 0.20 N3 + 0.10 N4

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**EXAMINATION RULES.**

Assistance and development of the proposed activities is mandatory. Tasks must be delivered by the deadline.
BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

Hyperlink:
- Frontiers. Resource
- FAO 2010
- FAO (document de l'estat de la biotecnologia)