

Course guide

390107 - BV - Plant Biology

Last modified: 24/01/2024

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).
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Mas Serra, Maria Teresa

Others: Verdu Gonzalez, Antonio Maria
Serrano Porta, Lidia
Sorribas Royo, Francisco Javier
Izquierdo Figarola, Jordi
Serrat Gurrera, Xavier

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Identification and characterization of vegetal species.

Transversal:

3. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.

TEACHING METHODOLOGY

The hours of directed learning consist:

- Theoretical classes (large group), the teacher makes an exhibition of three parts: (1) introduce the learning objectives, (2) present the basic concepts (3) search for the implication of students from one or more questions in order to relate these concepts.
- Practical classes (small group) to encourage students to carry out activities that are proposed and described in the scripts of practices, in order to learn various methodologies involved in Plant Biology.
- Guiding students in the elaboration of deliverable work of bibliographic research, in order to recognize and consult the information sources to perform specific work, as well as support for the realization and synthesis of experimental results work.

The student has support material (such as diagrams and photographs to support the theory classes, issue papers, the script of practical references to complementary readings, link to thematic Internet pages, etc.) to ATENEA. It also promotes independent learning, particularly through the deliverable work and through the interaction that is looking for at the theoretical classes.

LEARNING OBJECTIVES OF THE SUBJECT

After Vegetal Biology subject, the student should be able to:

- Understand the general life cycle of plants with seed and recognize the main morphological features.
- Assimilate the system of determination of seed plants and know the major groups of plants with ethnobotanical and economic interest.
- Understand the basics of nutrition and transport in higher plants and know their impact on plant production.
- Understand the processes that comprise the plant development and its hormonal control and identify the main applications in the area of artificial regulation.

STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	40,0	26.67
Hours small group	20,0	13.33

Total learning time: 150 h

CONTENTS

1.- ANATOMY AND MORPHOLOGY OF CORM

Description:

In this theme are studied plants as complex creatures with a vegetative development which, although follows common guidelines can lead to morphologies and diverse lifestyles.

It works:

- Tissue systems
- The embryonic organs, primary and secondary growth.
- The anatomy and morphology of roots, stems and functional leaves, emphasizing those tissues or organs that can present interesting changes in agricultural production and in the vegetative propagation.

Related activities:

Activity 1: Theory classes

Activity 2: Individual test content 1,2 and 3

Full-or-part-time: 31h

Theory classes: 6h

Self study : 25h

2.- BIOLOGY OF REPRODUCTION OF PLANTS

Description:

This content is devoted to the biology of reproduction. It works:

- The types of life cycles
- Flowers and inflorescences. Formation of male and female gametes.
- Pollination, fecundation, embryo development, seed and fruit formation.
- Types of fruits. Dispersal of fruits and seeds.
- Germination and epigea hipogea.

Related activities:

Activity 1: Theory classes

Activity 2: Individual test

Full-or-part-time: 20h

Theory classes: 10h

Self study : 10h

3.- DIVERSITY OF PLANTS, IDENTIFICATION AND DETERMINATION

Description:

Content on this work:

- The diversity in the morphology of the reproductive organs (flowers and fruits).
- The relationship between the morphology of the reproductive organs and the taxonomic position of species. The relationship between taxonomy and phylogeny
- The characteristics of the main groups of plants of economic and ethnobotanical interest

Related activities:

Activity 1: Theory classes

Activity 2: Individual test

Activity 5: Laboratory

Activity 6: Individual continued assessment test in laboratory.

Full-or-part-time: 24h

Theory classes: 4h

Laboratory classes: 10h

Self study : 10h

4.- TRANSPORTATION AND TRANSLOCATION OF WATER AND SOLUTES

Description:

In this theme are studied water and mineral nutrition of higher plants, emphasizing the key role of the root-soil interface in the context of the system SPAC (soil-plant-atmosphere continuum). It works:

- Water the plants.
- Transpiration and stomatal control.
- Nutrients and symptoms of nutritional deficiency.
- Absorption and transport of nutrients.
- Stem transport

Related activities:

Activity 1: Theory classes

Activity 3: Individual test

Activity 6: Laboratory

Full-or-part-time: 28h

Theory classes: 7h

Laboratory classes: 5h

Self study : 16h

5.- PLANT BIOCHEMISTRY AND METABOLISM

Description:

The content focuses on the study of hydrocarbonated nutrition and metabolism of higher plants, to understand, together with the content, the bases of atrophy plant and its involvement in the food web. It works:

- Photochemical phase of photosynthesis.
- Biochemical phase of photosynthesis.
- Plant respiration.
- The limiting factors and agronomic and ecological aspects of photosynthesis.
- Phloem transport and delivery of assimilated.
- Assimilation of nitrogen and sulfur

Related activities:

Activity 1: Theory classes

Activity 3: Individual test

Activity 5: laboratory report

Activity 6: laboratory

Full-or-part-time: 20h

Theory classes: 7h

Self study : 13h

6.- PLANT DEVELOPMENT

Description:

In this content it points out the basic concept of growth, cell differentiation and morphogenesis as structural elements in the development of higher plants, and studies the major internal and external regulatory elements of the processes of plant development.

It works:

- Plant development and regulation endogenous and exogenous.
- Photomorphogenic and light as a regulator of plant development.
- Hormones plant.
- Control of flowering and fruit development and seed.
- Life at rest.
- Senescence and abscission.

Related activities:

Activity 1: Theory classes

Activity 3: Individual test

Activity 5: Laboratory report

Activity 6: Laboratory

Full-or-part-time: 27h

Theory classes: 6h

Laboratory classes: 5h

Self study : 16h

ACTIVITIES

(ENG) ACTIVITY 1. THEORY LESSONS

Full-or-part-time: 40h

Theory classes: 40h

(ENG) ACTIVITY 2. INDIVIDUAL TEST (CONTENTS 1,2 AND 3)

Full-or-part-time: 1h 30m

Theory classes: 1h 30m

(ENG) ACTIVITY 3. INDIVIDUAL TEST (CONTENTS 4,5 AND 6)

Full-or-part-time: 1h 30m

Theory classes: 1h 30m

(ENG) ACTIVITY 4. LABORATORY

Full-or-part-time: 10h

Laboratory classes: 10h

(ENG) ACTIVITY 5: LABORATORY EVALUATION TESTS

Full-or-part-time: 1h

Laboratory classes: 1h

(ENG) ACTIVITY 6. LABORATORY

Full-or-part-time: 10h

Laboratory classes: 10h

GRADING SYSTEM

The final qualification of this subject, N_{final} , is calculated with the follow system:

N1: qualification of the writing test related to the contents 1 and 2.

N2: qualification of the writing test related to the contents 4,5 and 6.

N3: qualification of the writing test related to the contents 3.

N4: deliverables qualification of the practices related to the contents 4 and 6.

N5: qualification of the questionnaires related to the contents 4, 5 and 6.

$$N_{final} = 0,325 N1 + 0,35 N2 + 0,175 N3 + 0,1 N4 + 0.05 N5$$

If you have failed the subject (final mark), you will be able to re-evaluate the contents of the course (1,2,3,4,5 and 6) corresponding to the qualifications N1, N2, N3, N4 and N5 through a global writing exam.

BIBLIOGRAPHY

Basic:

- Raven, Peter H; Evert, Ray Franklin; Eichhorn, Susan E; Santamaria, Sergi; Lloret Maya, Francisco; Cardona i Florit, M. Àngels. *Biología de las plantas* (Vol. 2) [on line]. Barcelona: Editorial Reverté, [2015] [Consultation: 15/09/2020]. Available on: https://www.ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=7805. ISBN 9788429118421.

- Taiz, Lincoln; Zeiger, Eduardo. *Fisiología vegetal*. [Castelló de la Plana]: Universitat Jaume I, 2006. ISBN 9788480216012.

- Azcón Bieto, Joaquín; Talón, M. *Fundamentos de fisiología vegetal*. 2a ed. Madrid [etc.] : Barcelona: McGraw-Hill/Interamericana ; Edicions UB, 2008. ISBN 9788447532308.

- Strasburger, Eduard; Sitter, Peter. *Tratado de botánica*. 8a ed. castellana. Barcelona: Omega, 1994. ISBN 8428209790.

- Raven, Peter H.; Evert, Ray F.; Eichhorn, Susan E. *Biología de las plantas* (Vol. 1) [on line]. Barcelona [etc.]: Reverté, 1991-1992 [Consultation: 21/07/2022]. Available on: https://www.ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=7804. ISBN 8429118438.

- Font i Quer, Pius; Vallès Xirau, Joan; Vigo, Josep; Sierra i Ràfols, Eugeni. *Iniciació a la botànica*. 3a ed. rev. i actualitzada. Barcelona: Edicions de la Universitat de Barcelona, 2015. ISBN 9788447542024.

Complementary:

- Paniagua Gómez-Álvarez, Ricardo. *Citología e histología vegetal y animal* (Vol. 2) [on line]. 4ª ed. Madrid [etc.]: McGraw-Hill/Interamericana, 2007 [Consultation: 15/09/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=4139. ISBN 9788448155957.

- Nabors, Murray W; González Barrera, Paola; García Antón, Mercedes; Moreno Saiz, Juan Carlos. *Introducción a la botánica* [on line]. San Francisco: Pearson, Addison Wesley, [2006] [Consultation: 15/07/2022]. Available on: https://www.ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1250. ISBN

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- Paniagua Gómez-Álvarez, Ricardo. Citología e histología vegetal y animal (Vol. 2) [on line]. 4a edición. Madrid: McGraw-Hill Interamericana, 2007 [Consultation: 20/10/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5767http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=4139. ISBN 9788448173234.
- Izco, Jesús. Botánica [on line]. 2ª ed. Madrid [etc.]: McGraw-Hill-Interamericana, 2004 [Consultation: 15/07/2022]. Available on: https://www.ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5659. ISBN 8448606094.
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- Salisbury, Frank B.; Ross, Cleon W. Fisiología de las plantas. Vol. 2, Bioquímica vegetal. Madrid: International Thomson Editores Spain-Paraninfo, 2000. ISBN 8428327181.
- Salisbury, Frank B.; Ross, Cleon W. Fisiología de las plantas. Vol. 3, Desarrollo de las plantas y fisiología ambiental. Madrid: International Thomson Editores Spain-Paraninfo, 2000. ISBN 842832719X.
- Barceló Coll, Juan. Fisiología vegetal. Madrid: Pirámide, 2001. ISBN 8436815254.
- Paniagua Gómez-Álvarez, Ricardo. Citología e histología vegetal y animal (Vol. 1) [on line]. 4ª ed. Madrid [etc.]: McGraw-Hill/Interamericana, 2007 [Consultation: 15/07/2022]. Available on: https://www.ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5767. ISBN 9788448155933.
- Pérez García, Félix; Martínez-Laborde, Juan B. Introducción a la fisiología vegetal. Madrid: Mundi-Prensa, 1994. ISBN 8471144719.
- Pineda, Manuel. Resúmenes de fisiología vegetal. Córdoba: Servicio de Publicaciones. Universidad de Córdoba, 2004. ISBN 8478017186.
- Bolòs, Oriol de. Flora manual dels Països Catalans. 3a ed. Barcelona: Pòrtic, 2005. ISBN 8473068572.
- Díaz de la Guardia Chico, Manuel. Fisiología de las plantas. 2a ed. [Granada]: Grupo Editorial Universitario, 2010. ISBN 9788499151120.
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- Blackmore, Stephen. How plants work : form, diversity, survival. Princeton, NJ: Princeton University Press, 2018. ISBN 9780691177496.
- Bold, Harold C.; Delevoryas, Theodore; Alexopoulos, Constantine J. Morfología de las plantas y los hongos. Barcelona: Omega, 1989. ISBN 8428207542.
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RESOURCES

Hyperlink:

- Botànica Agrícola i Forestal. <http://botanicavirtual.udl.es>- Histología vegetal. http://www.inea.uva.es/servicios/histologia/inicio_real.htm- Library of Crop Technology Lesson Modules. <http://www.croptechology.unl.edu>