Universitat Autònoma de Barcelona

Plant Physiology and Metabolism

2022/2023

Code: 43863
ECTS Credits: 6

Degree	Type	Year	Semester
4316231 Plant Biology, Genomics and Biotechnology	OB	0	1

Contact

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Use of Languages

Principal working language: english (eng)

Other comments on languages

English is used in all lectures, seminars and lab sessions

Teachers

Isabel Corrales Pinart

Benet Gunse Forcadell

Mercè Llugany Olle

Carlota Poschenrieder Wiens

Roser Tolra Perez

Maria Soledad Martos Arias

Prerequisites

Basic knowledge in Plant Physiology and Plant Metabolism

Objectives and Contextualisation

Acquisition of an integrative view of how different organisation levels (molecular, metabolic, and physiologic) cooperate in the functioning of the whole plant, with special emphasis on the metabolic diversity of plants and its regulation by internal and external factors

Competences

- Apply biotechnological cell factory methods to plants and fungi to obtain new products.
- Apply knowledge of functional mechanisms of various different organizational levels in plants to the characterization of growth and development processes of the whole plant organism.
- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.

- Propose and analyze ad hoc solutions derived from plant research, in accordance with the situations and needs of each case.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use and manage bibliographical information and computer resources in the area of study.
- Use scientific terminology to argue the results of research and present them in English both orally and in writing in an international environment.

Learning Outcomes

1. Apply knowledge of plants' secondary metabolism to industrial biotechnological uses.
2. Choose and apply experimental tools for plant phenotyping.
3. Choose and apply model plants for the study of functional mechanisms in plants.
4. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
5. Describe the metabolic processes of plants and apply techniques to study these.
6. Describe the processes for transporting plants and apply techniques to study these.
7. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
8. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
9. Use and manage bibliographical information and computer resources in the area of study.
10. Use scientific terminology to argue the results of research and present them in English both orally and in writing in an international environment.

Content

Plant cell compartmentation

Energy transformation

Transport processes in plants and their regulation

Primary metabolism

Diversity of secondary metabolism

Industrial use of plant secondary metabolism

Experimental techniques in Plant Physiology and Metabolism

-Growth analysis and phenotyping

-Membrane stability

-Water and ion relationships

-Chlorophyll fluorescence

-Analysis of metabolism

Methodology

Presencial activities are lectures, seminars, lab. practice, and visit to research institution. Attendance is required; absence should be justified. Lectures are held by the academic staff. Seminars include an individual oral presentation by each student and discussion. For lab practice students are divided into 3 groups. Part of the lab practices are demostrative. For each practical session students have to prepare a report presenting and discussing the results.

Elaboration of seminar presentations and lab reportare supervised activities, and autonomous activities include scientific reading and personal study

Students can ask the academic staff for personal turorial session

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab practice	9.5	0.38	6, 5, 8, 9, 10
Lectures	18	0.72	1, 6, 5, 2, 3
Seminars	10	0.4	7, 8, 4
Type: Supervised			
Preparation of seminars and reports	24	0.96	1, 6, 5, 7, 8, 4, 2, 3, 9, 10
Type: Autonomous			
Personal study, consult and analysis of articles and reports	87.5	3.5	1, 6, 5, 7, 3, 9

Assessment

Final qualification is composed by the following items:

attendance and participation in lectures and seminars (10%),

report of laboratory activities 20%,

individual oral presentation at seminar 30%, and

written exam of lecture contents (40%)

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance and participation in lectures and seminars	10%	0	0	1, 7, 8, 10
Lab report	20%	0	0	7, 4, 3, 9, 10
Oral presentation	30%	0	0	7, 4, 9, 10
Written exam	40%	1	0.04	1, 6, 5, 8, 2

Bibliography

Barceló J, Nicolás G, Sabater B, Sánchez R (2001) Fisiología Vegetal. Pirámide, Madrid

Barceló J (2010) Perspectivas y retos de estudio en Fisiología vegetal, Boletin de la Sociedad Española de Fisiología vegetal 51: 35-44

Taiz L, Zeiger E, Moller IM, Murphy A (2014) Plant Physiology and Development, 6th edition. Sinaurer Assoc. Oxford Univ Press. http://6e.plantphys.net/

Buchanan BB, Griessen W, Jones RL (2015) Biochemistry & Molecular Biology of Plants. 2nd edition; Wiley, Blackwell, Chichester, U.K.

Jones R, Ougham H, Thomas H, Waaland S (2013) The Molecular Life of Plants, Wiley-Blackwell, Chichester, U.K.

Grierson CS et al (2011) One-hundred Questions Facing Plant Science Research. New Phytologist 192: 6-12. http://onlinelibrary.wiley.com/doi/10.1111/j.1469-8137.2011.03859.x/full

Software

No special software required