COURSE DATA

DATA SUBJECT

Code: 33930
Name: Molecular Plant Biology
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1111 - Grado en Biotecnología	Facultat de Ciències Biològiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1111 - Grado en Biotecnología	Optability	ELECTIVES

COORDINATION

CARRASCO SORLI PEDRO MIGUEL

SUMMARY

It is intended to provide the student with a molecular biotechnology and worldview of plants. To this end, basic skills are taught and the necessary molecular tools that allow them to form an integrated peculiarities of plants at the molecular level, both during development and in the responses of the same against the environment vision will be explained.
Students should acquire the knowledge necessary for an understanding of the subjects on the agenda, as well as the ability to discuss articles related.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

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Actuar con autonomía en el aprendizaje, tomando decisiones fundamentadas en diferentes contextos, emitiendo juicios en base a la experimentación y el análisis y transfiriendo el conocimiento a nuevas situaciones

Be able to convey ideas, problems and solutions in the field of biotechnology.

Be able to use English to write reports and to interpret information from protocols, manuals and databases.

Capacidad de interpretar datos relevantes.

Colaborar eficazmente en equipos de trabajo, asumiendo responsabilidades y funciones de liderazgo y contribuyendo a la mejora y desarrollo colectivo

Contribuir en el diseño, desarrollo y ejecución de soluciones que den respuesta a demandas sociales, teniendo en cuenta como referente los Objetivos de Desarrollo Sostenible

Demostrar razonamiento crítico y autocrítico en el ámbito de la titulación, considerando aspectos tales como la ética profesional, los valores morales y las implicaciones sociales de las diferentes actividades realizadas

Develop skills to undertake further study.

Have abilities for teamwork and cooperation in multidisciplinary teams.

Have abilities to disseminate and participate in the social debate on aspects related to biotechnology and its use.

Propose creative and innovative solutions to complex situations or problems, typical of the area of ¿¿¿¿connection, to donate responses to the various professional and social needs

Saber comunicarse de manera efectiva, tanto de forma oral como escrita, adaptándose a las características de la situación y de la audiencia

DESCRIPTION OF CONTENTS

1. Secondary metabolism

Products derived from secondary metabolism: function in the plant. biosynthetic pathways of secondary metabolism. Manipulation of secondary metabolism: biotechnological applications.

2. Signal perception and transduction

Characteristics of signal transduction pathways. Receptors, intracellular intermediaries, sensors and effectors. Kinase systems hybrid of two components: ethylene and cytokinin receptors. Photomorphogenesis. Answers to far-red and red light: phytochrome. Responses to blue light and ultraviolet (Answers B / UV): phototropins and Cryptochromes. Other photoreceptors. Signaling movements and gravitropism. The signalosome and signal transduction by light. Signaling kinases like receptors.

3. Timing

The circadian clock. Biological clocks in plants. Components of circadian systems: molecular organization. Circadian regulation of growth. Interactions between plant hormones and the biological clock.

4. Floral development

The floral development in upper plants. Signals that induce the flowering. The floral development in Arabidopsis. Development of the organs of the flower. Incompatibility gametofítica and esporofítica. Development of the fruit. Fructificación. Maduration and senescencia. Manipulation of the reproduction.

5. Senescence and programmed cell death

Types of cell death. Cell death in the life cycle of plants. Senescence: metabolic alterations during senescence. Regulation of metabolic activity in senescent cells. Growth regulators and senescence. Cell death in response to the development and stress.

6. Molecular answers to abiotic stress or environmental stress

Water deficit, salinity, oxidative stress. General mechanisms of response to abiotic stresses. Oxidative stress and the role of reactive oxygen species (ROS). Stress deficiency and excess metals.

7. Molecular interactions plant-pathogen

Molecular strategies pathogenic fungi, bacteria, viruses, invertebrates and herbivores. Biochemical aspects of defense. post-transcriptional silencing in virus defense. Interaction Plant-Agrobacterium.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	25,00
Laboratory	20,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	3,00
Individual or group project	4,50
Independent study and work	30,00
Preparation of lessons	30,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

- Theoretical classes with no compulsory attendance
- Preparation of projects and their presentation in seminars
- Classes practicals with compulsory attendance

EVALUATION

An exam at the end of the semester will consist of issues related to the program content will be made. The test is scored on 7.5 points. It will be based on a number of issues, previously provided to the student. For the resolution of the issues the student will be based on class notes and a series of articles that will go forward as providing lectures. Likewise, practices score of 2.5, broken down as follows: 0.5 points will be assessed on the student's attitude during the test and two points a written test to be held simultaneously to the theory exam. Attendance at practices is mandatory, failing to pass the course, in any of his calls, the student who has not attended to them.
Exposing volunteer work may increase up to one point qualification exam.

REFERENCES

Bibliografía General.

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- Hopkins WG (1999). Introduction to Plant Physiology. John Wiley and Son, Inc.
- Jones, R., Ougham, H., Thomas, H. and Waaland, S. (2013). The Molecular Life of Plants. Wiley-Blackwell
- Lea, P.J. and R.C. Leegood (1999). Plant Biochemistry and Molecular Biology. 2ª edición. John Wiley and Sons Ltd.
- Raven, P.H., R.F. Evert y S.E. Eichhorn (1986). Biology of Plants 4th edition. Worth Publishers, Inc.
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- Smith AM, Coupland G, Dolan L, Harberd N, Jones J, Martin C, Sablowski R y Amey A (2009) Plant biology. Garland Science, Nueva York.
- Taiz L, Zeiger E (2006). Fisiología Vegetal. Publicaciones de la Universitat Jaume I, Castellón.
- Taiz L, Zeiger E (2006). Plant Physiology. 4th. Cumming Publ. Company, Inc.
- Westhoff, P. (1998). Molecular plant development from gene to plant. Oxford University Press.

- Se usarán revisiones de publicaciones periódicas como el Trends in Plant Science, Current Opinion in Plant Biology y similares, para aspectos concretos del temario.