



IDENTIFYING DATA

Biotechnology applied to plant production

Subject	Biotechnology applied to plant production			
Code	V02G031V01411			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	Spanish			
Department				
Coordinator	Barreal Modroño, M. Esther			
Lecturers	Barreal Modroño, M. Esther Canchaya Sanchez, Carlos Alberto Gallego Veigas, Pedro Pablo			
E-mail	edesther@uvigo.es			
Web	http://bioloxia.uvigo.es/es/			
General description	The subject will provide the student with skills in four areas: plant production systems and good practices, plant breeding and reproduction techniques (plant biotechnology), plant safety and health, legislation and regulations. The subject includes master classes, seminars, case studies in cooperative learning, and practical laboratory classes. http://bioloxia.uvigo.es/gl/docencia/horarios			

Training and Learning Results

Code	
A4	Students should be able to communicate information, ideas, issues and solutions to all audiences (specialist and unskilled audience).
A5	Students should develop the necessary learning skills to undertake further studies with a high degree of autonomy.
B4	Draft and write reports, documents and projects related to Biology. Proceed to their presentation and debate in the teaching and specialized areas, highlighting the competences of the degree.
B5	Develop capacities for creativity, innovation and entrepreneurship, in academic and social relevant fields as well as in interaction with the productive sector.
B7	To aim for quality objectives in the development of the activity done and incorporate ethical principles, which should prevail in the professional practice of Biology.
C4	Isolate, identify and grow microorganisms, cells, tissues and organs, making easier their study and the assessment of their metabolic activity.
C9	Identify resources of biological origin and assess their efficient and sustainable use in order to obtain products of interest. Propose and implement improvements in production systems.
C10	Identify biological and biotechnological processes and their potential applications, in particular in health, agri-food and environmental fields.
C11	Perform and interpret bioassays, identify chemical and biological agents, including pathogens, as well as their toxic products. Develop and apply biological control techniques.
C12	Writing reports and technical dossiers, as well as directing and executing projects on topics related to biology and its applications.
C19	The ability to manage animal, plant and microbial production processes, implement biological tools that improve production efficiency and identify new areas of application and professional opportunities.
C20	Understanding the social projection of biology applied to production at its different levels of application (analytical, production and management) and its repercussions on professional practice.
D3	Commitment to sustainability and the environment. Equal, sensible and efficient use of resources.
D4	Collaborate and work in teams or multidisciplinary groups, promote negotiation skills and the ability to reach agreements.
D5	Communicate effectively and appropriately, including the use of computer tools and English.

Expected results from this subject

Expected results from this subject	Training and Learning Results			
	A5	B4	C9 C10 C20	D3
To identify the main plant production systems.	A5	B4	C9 C10 C20	D3
To understand the basics of plant production from a biological and sustainable perspective.	A5	B7	C9 C20	D3
To understand plant breeding techniques and asexual reproduction.	A5	B4	C4 C9 C10	D5
To understand the genetic and biotechnological tools of plant breeding.	A5		C9 C10 C19	D5
Handling the scientific-technical instrumentation related to plant breeding in the laboratory.	A5	B7	C4 C11 C19	D4
Applying knowledge and technologies related to plant production in aspects of production, exploitation, analysis and diagnosis of plant biological processes and resources.	A4 A5	B4 B7	C12	D3 D4 D5
Applying knowledge related to plant production to advise, supervise and provide expertise on scientific-technical, ethical, legal and socio-economic aspects related to living beings and the environment.	A4	B4 B5 B7	C11 C12 C19 C20	D3 D4 D5
To obtain information, develop experiments and interpret results using the scientific method.	A5	B7	C11 C12 C19	D4 D5
To understand the social projection of plant production and its repercussions on professional practice.	A4 A5	B4 B5 B7	C12 C19 C20	D3 D4 D5

Contents

Topic	
Block 1: Production systems (Plant Physiology Area).	Topic 1. Basis of Plant Production.
Block 1: Production systems (Plant Physiology Area).	Topic 2. Plant Production Techniques
Block 2: Plant Breeding (Genetic Area)	Topic 3. Fundamentals of Plant Breeding
Block 2: Plant Breeding (Genetic Area)	Topic 4. Fundamentals of Genomic Selection
Block 3: Plant Biotechnology (Plant Physiology Area)	Topic 5. Introduction to Plant Biotechnology
Block 3: Plant Biotechnology (Plant Physiology Area)	Topic 6. Genetic transformation of plants
Block 4: Plant health and legislation.(Plant Physiology Area)	Topic 7. Plant Health
Block 4: Plant health and legislation. (Plant Physiology Area)	Topic 8. Intellectual property and standards.
Practice	1. Water stress and plant production 2. Introduction to adventitious morphogenesis 3. Poor plant nutrition and its impact on yield

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	23	45	68
Problem solving	6	6	12
Seminars	6	6	12
Laboratory practical	12	24	36
Objective questions exam	2	7	9
Report of practices, practicum and external practices	0	4	4
Case studies	0	8	8

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

Description

Introductory activities	A class will be dedicated to the presentation of the subject and the teaching guide, with an explanation of the evaluation procedure and indication of the deadlines for the work.
Lecturing	The master sessions are 50-minute lessons, to explain and develop the contents of Plant production. They must be completed with autonomous work of the student consulting books of text and further reading, mainly scientific articles.
Problem solving	Cooperative learning is formulated based on problems and cases.
Seminars	Seminar methodology is formulated with collaborative work and presentation of teamwork for the agricultural systems section.
Laboratory practical	These are mandatory laboratory practices consisting of familiarization of students with basic plant culture techniques and plant biotechnology.

Personalized assistance

Methodologies	Description
Lecturing	Throughout the term, teachers will be available in person at their offices during tutoring hours. It is recommended to make an appointment by mail to avoid crowds, you wait and/or the teacher has a busy schedule that day.
Problem solving	Consultations can be made by e-mail or through the TEMA platform, in addition to being able to use face-to-face tutorials
Seminars	Tasks will be carried out to solve problems and exercises that will be dealt with in the same seminar.
Laboratory practical	The laboratory sessions will include a temporary space to perform tasks that will serve as training for the realization of the practice report.

Assessment

	Description	Qualification	Training and Learning Results			
Objective questions exam	The final exam will consist of objective questions related to the learning achieved.	30	A5	B4	C4	D3
Report of practices, practicum and external practices	Presentation of a final report in which the methodology, materials, data obtained, statistical analysis, graphic representation and discussion of the results obtained will be presented, including all the literature consulted.	40	A4 A5	B4 B7	C4 C10 C11 C12 C19 C20	D4 D5
Case studies	The evaluation of the seminars will be done through collaborative work (plant physiology) and problem solving of individual form (Genetics) together with the delivery of a small report or an objective test.	30	A4 A5	B5	C9 C11 C19	D3

Other comments on the Evaluation

Given that the training and continuous evaluation activities programmed within the Laboratory Practices and Seminars are designed to train students in skills and competences directly related to the exercise of the profession in the field of biotechnology applied to plant production, the attendance and participation of students in both evaluable activities is mandatory, in such a way that the absence or unjustified non-performance of these activities will prevent passing the subject. Therefore, considering the practical nature and the results of training and learning that are sought to achieve with both methodologies, students who opt for the global evaluation mode must also perform these activities.

It will be essential to obtain in each of the parts, at least 40% of the total evaluation, to compensate.

Students who do not meet this requirement at the first opportunity will be graded on the transcript with the highest grade achieved in the failed parts, and must repeat at the second opportunity (July) the test related to the part or parts in which they have not reached the 4.0. Logically, students who find themselves in this situation will keep the grade of the part/s passed (≥ 4.0) in the first opportunity and of the Practicals and Seminars, to take them into account in the final grade. In the second opportunity, it will also be essential to reach 4.0 in all the parts subject to recovery. The reports of practices and seminars that must be passed in the second call will be done individually. In the case of internships, once passed, the grade will be kept for the following year.

Ethical aspects, plagiarism will be prosecuted in the works, as well as copying from other students during the evaluation tests, which may be cause for a reduction of the grade and even a failure in the subject. This fraudulent conduct will be sanctioned with the firmness and rigor established by current regulations and may result in the suspension of the course for an entire academic year.

The dates of the exams are indicated in the following link:

<http://bioloxia.uvigo.es/es/docencia/examenes>

Sources of information

Basic Bibliography

Parker, R, **La Ciencia de las Plantas**, 1ª, Editorial Paraninfo, 2000

Ferreira, JJ; Ordás, A y Pérez M, **La genética de los caracteres cuantitativos en la mejora vegetal del siglo XXI**, 1ª, Sociedad Española de Genética y Sociedad Española, 2012

David P. Clarck y Nanette J. Pazdernik, **Biotechnology**, 2ª, Elsevier, 2016

Anis M. y Ahmad N., **Plant tissue culture: propagation, conservation and crop improvement**, 1ª, Springer, 2016

Caballero, A., **Genética Cuantitativa**, 1ª, Editorial Síntesis, 2017

Complementary Bibliography

Cubero, JL, **Introducción a la mejora genética vegetal**, 2ª, Ediciones Mundi Prensa, 2002

Casal, I; García-López, JL; Guisán, JM y Martínez Zapater, JM, **La Biotecnología Aplicada a la Agricultura**, 1ª, Eumedía S.A., 2000

Varshney, RK y Tuberosa, R, **Genomics-Assisted Crop Improvement**. Springer, 1ª, Springer, 2007-2010

Recommendations

Subjects that continue the syllabus

Drafting and execution of projects/V02G030V01801

Final Year Dissertation/V02G030V01991

Subjects that are recommended to be taken simultaneously

Quality management and control/V02G030V01911

Agri-food analysis and diagnostic/V02G031V01409

Biotechnology applied to microbiological production/V02G031V01412

Subjects that it is recommended to have taken before

Plant physiology I/V02G030V01503

Plant physiology II/V02G030V01603

Genetics II/V02G030V01505