



IDENTIFYING DATA

Plant Production

Subject	Plant Production			
Code	V02G030V01909			
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			
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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. English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English. http://bioloxia.uvigo.es/gl/docencia/horarios			

Training and Learning Results

Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secondary Education and with a level that, even though it is supported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
A2	Students should know how to apply their knowledge to their work or vocation in a professional way. They also should have the competences that are usually proved through the elaboration and defence of arguments and the resolution of problems within their study field.
A3	Students should prove ability for information-gathering and interpret important data (usually within their study field) to judge relevant social, scientific or ethical topics.
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
B2	Ability of reading and analyzing scientific papers and having critical assessment skills to understand data collection, deducing the main idea from the least relevant ones and basing on the corresponding conclusions.
B3	Acquisition of general knowledge about the basic subjects of biology, both at theory and experimental level, without dismissing a higher specialization in subjects that are oriented to a concrete professional area.
B4	Ability in handling experimental tools, both scientific and computer technology equipment that support the search for solutions to problems related to the basic knowledge of biology and with those of a concrete labour context.
B7	Collection of information about issues of biologic interest, analysis and emission of critical opinions and reason them including the reflection about social and/or ethical aspects related to the issue.
B10	Development of analytic and abstraction skills, the intuition and the logical and rigorous thought through the study of biology and its uses.
B11	Ability to communicate in detail and clearly: knowledge, methodology, ideas, issues and solutions to all audiences (not only qualified but unskilled in Biology).
B12	Ability to identify their own educational necessities in the biology field and in concrete labour areas and to organize their learning with a high grade of autonomy in any context.
C3	Identifying, analysing and characterizing biological samples, including those of human origin, and possible anomalies.
C4	Isolating, analysing and identifying biomolecules, viruses, cells, tissues and organs.
C5	Growing microorganisms, cells, tissues and organs.
C7	Manipulating and analysing genetic data and carrying out genetic counseling

C10	Analysing and assessing the adaptation of living beings to the environment.
C16	Growing, producing, transforming, improving biological resources as well as getting profits.
C17	Identifying and obtaining natural biological products
C18	Producing, transforming, controlling and preserving Agro-Food products.
C19	Identifying, addressing and communicating Agro-Food and environmental risks.
C20	Designing, using and supervising biotechnological processes.
C21	Processing and interpreting bioassays and biological diagnoses.
C23	Developing, managing and using biological control techniques.
C24	Designing biological process models.
C25	Gathering background information, develop experimental work and analysing data results
C29	Helping and evaluating scientific, technical, ethical, legal and socioeconomically aspects related to Biology.
C31	Knowing and handling technical and scientific apparatus.
C32	Knowing and handling basic or specific key concepts and terminology
C33	Understanding the social projection of Biology.
D1	Development of capacity of analysis and synthesis
D2	Acquisition of the organization and planning capacity for tasks and time
D3	Development of oral and writing communication abilities
D4	Acquisition of foreign language knowledge related to the study field
D5	Use of computer resources related to the study field
D6	Research and interpreting of information from different sources
D7	Resolution of issues and decision making in an effective way
D8	Development of the ability of independent learning
D9	Ability to work in collaboration or creating groups with an interdisciplinary character
D10	Development of the critical thinking
D11	Acquisition of an ethical agreement with the society and the profession
D12	Respectful behaviour to diversity and multiculturalism
D13	Sensitivity for environmental issues
D14	Acquisition of abilities in the interpersonal relationships
D15	Development of creativity, initiative and entrepreneurial spirit
D16	Acceptance of a quality commitment
D17	Development of the self-criticism ability

Expected results from this subject

Expected results from this subject	Training and Learning Results			
To know the main plant production systems	A1	B10 B12	C16 C18 C32	D6 D8 D12 D13 D14 D16
To understand plant reproduction and improving techniques	A1	B10 B12	C16 C17 C18 C32	D6 D8 D10 D14 D15 D16
To know the basic concepts in plant biotechnology	A1 A5	B3 B10	C16 C17 C18 C32	D6 D8 D10 D13 D14 D15 D16
To know the basic principles of plant safety and hygiene	A1 A5	B2 B3 B10 B12	C7 C16 C17 C18 C19 C32	D6 D8 D10 D11 D12 D13 D14 D15 D16

To know the legislation and regulations in plant production	A5	B3 B10 B12	C7 C16 C17 C18 C19 C20 C29 C32	D5 D6 D10 D11 D12 D13 D14 D15 D16
To apply knowledge of plant production to isolate, identify, manage and analyze specimens and samples of biological origin, as well as to characterize their cellular and molecular constituents.	A2 A3	B2 B4 B7	C3 C4 C5 C7 C23 C25	D2 D5 D6 D7 D8 D10 D14 D15 D16 D17
To analyze and interpret the adaptations of living beings to the environment	A2 A5	B3 B4 B10	C3 C4 C5 C10 C23	D1 D6 D7 D10 D13 D14 D15 D16 D17
To apply knowledge and technology relating to plant production in aspects related to the production, harvesting, analysis and diagnosis of biological processes and resources	A2 A4	B4 B10 B11	C3 C4 C5 C7 C19 C23 C25	D5 D6 D7 D8 D10 D14 D15 D16
To obtain information, perform experiments and interpret results	A3	B2 B7 B10	C5 C7 C20 C21 C23 C24 C25 C31	D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D14 D15 D16 D17
To apply knowledge of plant production to advise, supervise and assess scientific-technical, ethical, legal and socio-economic aspects related to living beings and the environment	A3 A5	B2 B3 B7 B10	C3 C4 C5 C7 C19 C23 C25 C29 C33	D2 D3 D5 D6 D7 D8 D11 D12 D15 D16 D17
Understanding the social projection of plant production and its impact on professional practice	A3	B2 B7 B10 B12	C7 C19 C20 C33	D6 D10 D11 D13 D15 D16 D17

To know and manage the concepts, terminology and scientific-technical instrumentation related to plant production	A2 A4	B4 B10 B11 B12	C5 C7 C20 C31	D2 D4 D5 D15 D16
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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	46	69
Problem solving	6	6	12
Seminars	6	6	12
Laboratory practical	12	24	36
Objective questions exam	1	7	8
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 MOOVI 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	A1 A3 A5 B10 B12	B2 B3 B4 C18 C19	C7 C16 C17 C18 C19 C32	D1 D3 D6 D8 D12
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	A3 A4 A5 B7 B10 B11	B2 B3 B4 C10 C16 C17	C3 C4 C5 C10 C16 C17 C19 C20 C21 C23 C24 C25 C31 C33	D2 D4 D5 D6 D7 D9 D10 D11 D13 D14 D15 D16 D17
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	A1 A5 B10 B12	B2 B3 C19 C29 C32	C3 C19 C29 C32	D1 D3 D6 D8 D17

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

Animal production/V02G030V01907

Microbial Production/V02G030V01908

Subjects that it is recommended to have taken before

Plant physiology I/V02G030V01503

Plant physiology II/V02G030V01603

Genetics II/V02G030V01505