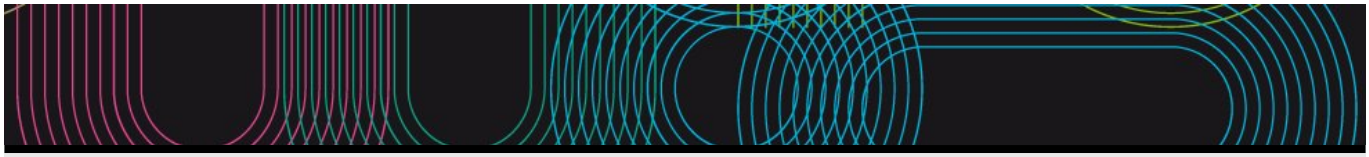

IDENTIFYING DATA				
Plant physiology I				
Subject	Plant physiology I			
Code	V02G031V01303			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	González Rodríguez, Luis			
Lecturers	González Rodríguez, Luis Sánchez Moreiras, Adela María			
E-mail	luis@uvigo.gal			
Web	http://webs.uvigo.es/agrobiologia/index.html			
General description	(*) The aims of the **asignatura of Vegetal Physiology *I head to to achieve that the students obtain a current vision of the scientific knowledge developed in the field of the Vegetal Physiology. It pretends that the student obtain the theoretical basic knowledges-practical necessary to comprise the operation **fisiolóxico of the plants and like this purchase the foundations for his application in matters but specific.			

Training and Learning Results	
Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secundary Education and with a level that, even though it is suppported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
A4	Students should able to communicate information, ideas, issues and solutions to all audiences (specialist and unskilled audience).
B1	Developing autonomous learning by identifying their own training need and organizing and planning tasks and time.
B2	Manage scientific-technical information using diverse and reliable sources. Analyze data and documents and interpret them critically and rigorously, including considerations on their social relevance and in the professional field of Biology.
C3	Perform and interpret molecular, physicochemical and biological analyses, including samples of human origin. Conduct assays and functional tests under normal and abnormal conditions.
C6	Understanding and integrate the functioning of living beings (cellular, tissue, organ and individual level), explaining their homeostatic and adaptive responses.
C8	Describe, assess and plan the physical environment, use bio-indicators and identify environmental problems. Provide solutions for the control, monitoring and restoration of ecosystems.
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.
D1	Understand the meaning and use of the gender perspective in the different fields of knowledge and in professional practice with the aim of achieving a fairer and more equal society.
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.

Expected results from this subject	Training and Learning Results			
New	A1 A4		C3 C6 C8	D1 D3
New	A1 A4	B1 B2	C3 C8 C9	
New	A1		C6 C8 C9	D3

New		B2	C3 C6	
New	A1 A4	B1 B2	C3 C6 C8 C9	D3
New	A1 A4			D1 D3 D4
New	A4	B2	C3 C6 C8 C9	

Contents	
Topic	
Physiology of the plant cell	Introduction to Plant Physiology. The plant cells: organelles, membranes and cellular wall. Mechanism of extension of the cellular wall.
Water relations and transport	- Water relativo a of the plant cell. Water potential. Plasmolise. Turgidity. - Absorption of water by the plants. The water in the soil. Absorption of the water by the roots. Movement of the water through the root. - Movement of the water through the plant. Mechanism of ascending transport. - Transpiration. Stomas. Opening mechanism and closing. Water Balance. - Absorption of ions by the plants. The elements in the soil. Absorption by the root. Movement of ions in the plant. - Translocation of solutes. Characterisation of the transport. Hypothesis of the flow of pressure.
Photosynthesis	- Photosynthesis. General equation. Magnitude of the photosynthesis. - Chloroplasts. Structure. Photosynthetic pigments. Ultrastruture of the thylakoid system. - Capture of the light energy. Structure of the Photosystems: centres of reaction and complex LHC. - Transduction of the energy. Transport of electrons. - Photophosphorylation. Quimioosmotic Hypothesis. ATP-sintase. Synthesis of ATP. - Photosynthetic fixation of the CO2. Cycle of Calvin. Stoichiometry of the cycle. Regulation. - Photorespiration. Biochemical mechanism. Intracellular location. Biological meaning. - Plants C-4. Structure of the leaf. Biochemistry of the route C-4. Types of C-4 plants. - Crassulacean Acid Metabolism (CAM). Biochemistry of the fixation of CO2. Regulation. - Photosynthetic productivity. Concept of point of compensation. Factors that affect to the photosynthesis: light, CO2, water. - Utilisation of the Carbon fixed. Synthesis of starch and sucrose. Exchange of substances between the chloroplast and the cytoplasm.
Secondary metabolism	- Characteristic of the secondary metabolism - Flavonoids - Terpenoids - Nitrogen compounds
Practices of laboratory	1. Determination of the Water potential of a plant tissue 2. Physiology of the stomas. Observation of the stomas and assessment of the stomatal opening and closing. 3. Extraction, separation and quantification of photosynthetic pigments of plants 4. Crassulacean acid metabolism 5. Effect of the temperature on the oxidative respiration 6. Writing of the manual of practices

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	30	30	60
Seminars	3	36	39
Case studies	0	4	4

Laboratory practical	15	30	45
Essay questions exam	2	0	2

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

Methodologies

	Description
Lecturing	The master lessons of the educational programming are organised in lessons of 50 min of length. They devote to explain and develop the concepts and basic methodologies in Plant Physiology. They have to be completed with autonomous work of the student by means of books of text, complementary readings, pages web of reference. They will arouse also study of cases that the student will have to resolve by his/her account delivering in the date established.
Seminars	The tutoring of 6-8 students allow to supervise the group in the realisation of a bibliographic work in which it prevail the organisation of the work of the group and that end in the writing of a text of no more than 30 pages and no less than 10 that it will be evaluated, as well as in a presentation of 15 minutes that also will form part of the evaluation of this section.
Case studies	Each 10-15 days will arouse a case in class that the student will have to resolve of individual way with the help of educational material specialised.
Laboratory practical	The practices of laboratory are aroused with the aim to complement the master sessions, familiarise the student with the protocols of laboratory in Plant Physiology and realise concrete experiments that the student will have to value delivering a manual of practices

Personalized assistance

Methodologies	Description
Lecturing	Students must learn to work autonomously by carrying out the non-face-to-face activities indicated in the lectures and studying the proposed topics. They must also learn to work in a team, for which, under the supervision of the teachers, they will carry out a project with a public presentation. They will also be able to resolve doubts about the subject during the personalised tutoring hours.
Seminars	Besides the regular tutoring, the group tutoring will allow to work much more with the student in the study of cases, in the development of the memory of practices and in the presentation of works
Laboratory practical	They will be interactive and will allow to establish actions customized of reinforcement. During the realization of the practices of laboratory the professors will give attention customized to the students for the correct understanding of the experimental objectives and of the methodology used. The student owes to learn to work in team. Once finalized the practical, the group of students will be supervised in their work by a professor. It contemplates also the resolution of doubts and problems through the platform TEMA or with the tutoring.
Case studies	The student owes to learn to work of autonomous form realizing autonomous activities that are indicated in the master sessions and studying the subjects proposed. Also they owe to learn to work in team under the supervision of the professors, will realize a work with public presentation. These works will have supervision in group tutoring, and will be able to form part of individual tutoring.
Tests	**Description**
Essay questions exam	The students will be able to resolve doubts of the subject during them time of individual tutoring.

Assessment

	Description	Qualification	Training and Learning Results			
Seminars	Preparation of bibliographic works and 15 min presentation of the main results.	25	A1 A4	B1 B2		
Case studies	Solution and analysis of suppositions	5	A1 A4	B1 B2	C8 C9	D4
Laboratory practical	Evaluation of the capacity of criticism in function of the development of the experimental design	30	A1	B1	C3 C6	D3 D4
Essay questions exam	Where will value the knowledges purchased in the sessions *magistrales	40	A1 A4		C3 C6	D1 D3

Other comments on the Evaluation

The students must reach a qualification of 4/10 in every part (exam, laboratory practices and seminars) to be evaluated. There is also the possibility of doing a unique final exam with theoretical and practical questions.

The type of exam can be discussed with the teachers of the matter.

All the parts with positive evaluation in june will be saved until july.

Class timetable:

http://bioloxia.uvigo.es/en/teaching/schedules

Exam□s dates

http://bioloxia.uvigo.es/en/teaching/exams

Sources of information
Basic Bibliography
Azcón-Bieto, J.; Talón, M, **Fundamentos de Fisiología Vegetal**, 2013
Taiz, L.; Zeiger, E, **Fisiología Vegetal**, 2010
Buchanan, B.B.; Gruissem, W.; Jones, R.L., **Biochemistry and Molecular Biology of Plants.**, 2015
Salisbury, F.B.; Ross, R., **Fisiología de las Plantas.**, 2000
Complementary Bibliography
Díaz de la Guardia, M., **Fisiología de las plantas.**, 2004
Pineda, M., **Resúmenes de Fisiología Vegetal.**, 2004

Recommendations
Subjects that continue the syllabus
Plant physiology II/V02G030V01603
Plant Production/V02G030V01909