



| Teaching Guide      |                                                                                                                                                                                                                                                                            |       |             |                                                                                                                      |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------|----------------------------------------------------------------------------------------------------------------------|
| Identifying Data    |                                                                                                                                                                                                                                                                            |       |             | 2015/16                                                                                                              |
| Subject (*)         | Fisioloxía vexetal aplicada                                                                                                                                                                                                                                                |       | Code        | 610G02029                                                                                                            |
| Study programme     | Grao en Bioloxía                                                                                                                                                                                                                                                           |       |             |                                                                                                                      |
| Descriptors         |                                                                                                                                                                                                                                                                            |       |             |                                                                                                                      |
| Cycle               | Period                                                                                                                                                                                                                                                                     | Year  | Type        | Credits                                                                                                              |
| Graduate            | 1st four-month period                                                                                                                                                                                                                                                      | Third | Obligatoria | 6                                                                                                                    |
| Language            | Spanish                                                                                                                                                                                                                                                                    |       |             |                                                                                                                      |
| Teaching method     | Face-to-face                                                                                                                                                                                                                                                               |       |             |                                                                                                                      |
| Prerequisites       |                                                                                                                                                                                                                                                                            |       |             |                                                                                                                      |
| Department          | Bioloxía Animal, Bioloxía Vexetal e Ecoloxía                                                                                                                                                                                                                               |       |             |                                                                                                                      |
| Coordinador         | Pomar Barbeito, Federico                                                                                                                                                                                                                                                   |       | E-mail      | federico.pomar@udc.es                                                                                                |
| Lecturers           | Bernal Pita da Veiga, angeles<br>Diaz Varela, Jose<br>Pomar Barbeito, Federico<br>Silvar Pereiro, Cristina<br>Velooso Freire, Javier                                                                                                                                       |       | E-mail      | angeles.bernal@udc.es<br>jose.diaz.varela@udc.es<br>federico.pomar@udc.es<br>c.silvar@udc.es<br>javier.veloso@udc.es |
| Web                 |                                                                                                                                                                                                                                                                            |       |             |                                                                                                                      |
| General description | This course complements the contents acquired in Plant Physiology I and II, from an applied perspective. Will be addressed in different subjects, agricultural, experimental and industrial processes, where the theoretical concepts of Plant Physiology are implemented. |       |             |                                                                                                                      |

| Study programme competences / results |                                                                                  |
|---------------------------------------|----------------------------------------------------------------------------------|
| Code                                  | Study programme competences / results                                            |
| A10                                   | Avaliar actividades metabólicas.                                                 |
| A18                                   | Levar a cabo estudos de produción e mellora animal e vexetal.                    |
| A21                                   | Deseñar modelos de procesos biolóxicos.                                          |
| A26                                   | Deseñar experimentos, obter información e interpretar os resultados.             |
| A29                                   | Impartir coñecementos de Bioloxía.                                               |
| A30                                   | Manexar adecuadamente instrumentación científica.                                |
| A31                                   | Desenvolverse con seguridade nun laboratorio.                                    |
| B2                                    | Resolver problemas de forma efectiva.                                            |
| B3                                    | Aplicar un pensamento crítico, lóxico e creativo.                                |
| B4                                    | Traballar de forma autónoma con iniciativa.                                      |
| B5                                    | Traballar en colaboración.                                                       |
| B6                                    | Organizar e planificar o traballo.                                               |
| B8                                    | Sintetizar a información.                                                        |
| B9                                    | Formarse unha opinión propia.                                                    |
| B10                                   | Exercer a crítica científica.                                                    |
| B11                                   | Debater en público.                                                              |
| B12                                   | Adaptarse a novas situacións.                                                    |
| B13                                   | Comportarse con ética e responsabilidade social como cidadán e como profesional. |

| Learning outcomes |                                       |
|-------------------|---------------------------------------|
| Learning outcomes | Study programme competences / results |



|                                                                                                                                                      |                                        |                                                              |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------|--|
| Increase knowledge and theoretical bases on the use of plant products in industry and human and animal health.                                       | A10<br>A18<br>A26<br>A29<br>A30<br>A31 | B2<br>B8                                                     |  |
| increase knowledge on the physiological mechanisms related to agriculture and crop production. Knowing the techniques for improving crop production. | A10                                    | B2                                                           |  |
| Generate a preliminary vision on the in vitro culture and plant biotechnology                                                                        | A26                                    | B9                                                           |  |
| Prepare and present works on some aspect of Applied Plant Physiology                                                                                 | A21<br>A26<br>A29                      | B3<br>B4<br>B5<br>B6<br>B8<br>B9<br>B10<br>B11<br>B12<br>B13 |  |

| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sub-topic                          |
| Topic 1 Introduction. Plant Physiology in Agriculture<br>Topic 2. Plant productivity and conditioning factors in agriculture<br>Topic 3. Development Plant Growth Regulators in Agriculture<br>Topic 4. Mechanism of action of pesticides and herbicides<br>Topic 5. Introduction to cell cultures. Main methodology<br>Topic 6. In vitro plant tissue cultures.<br>Topic 7. Current applications of cell culture and plant tissue<br>Topic 8. Vegetative propagation<br>Unit 9- Remote Sensing<br>Topic 10 -. Chlorophyll fluorescence<br>Topic 11 -. Industrial products from plants<br>Topic 12 -. Secondary metabolites on human health | Development of the proposed topics |

| Planning                                                                                                                        |                                 |                                      |                               |             |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests                                                                                                           | Competencies / Results          | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech                                                                                                  | A10 A18 A21 A26<br>A29 B2 B3 B8 | 18                                   | 45                            | 63          |
| Seminar                                                                                                                         | B4 B5 B6 B9 B10 B11<br>B12 B13  | 10                                   | 25                            | 35          |
| Mixed objective/subjective test                                                                                                 | A10 A18 B2 B6 B8                | 4                                    | 0                             | 4           |
| Laboratory practice                                                                                                             | A30 A31                         | 20                                   | 26                            | 46          |
| Personalized attention                                                                                                          |                                 | 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

| Methodologies                   | Description                                                                                                                                                                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Guest lecture / keynote speech  | Oral presentation of the topic supplemented with PowerPoint presentations, videos and / or diagrams on the board. During the development of the topic questions will be inserted students to reflect on and answer them orally, prior to explanation by the teacher. |
| Seminar                         | Technical working group aims intensive study of a topic. It will take place in very small groups of 10-15 students. It will include a final presentation and discussion                                                                                              |
| Mixed objective/subjective test | Consist of two parts, in which the knowledge acquired theoretical and practical point is evaluated. The mixed evidence may include essay questions, multiple choice or problems                                                                                      |
| Laboratory practice             | Methodology that allows estudiantes effectively learn through conducting practical activities, such as demonstrations, exercises, experiments and research.                                                                                                          |

## Personalized attention

| Methodologies | Description                                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Seminar       | Students, in groups of 10, will meet with the teacher to prepare the seminar work. In addition, tutorial sessions, each student will discuss with the teacher the progress of the work and all the doubts that may arise. |

## Assessment

| Methodologies                   | Competencies / Results      | Description                                                                                   | Qualification |
|---------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------|---------------|
| Mixed objective/subjective test | A10 A18 B2 B6 B8            | Examination of the theoretical and practical knowledge.<br>40% theoretical.<br>20% practical. | 60            |
| Seminar                         | B4 B5 B6 B9 B10 B11 B12 B13 | Activities during the seminars will be evaluated on an ongoing basis by the teacher.          | 40            |

## Assessment comments

The qualification assessment will have two parts:

- 1) Theoretical part of the course, including two methodologies: "Seminario" ("seminar"), and the theoretical part of "proba mixta" (final exam).
- 2) Practical part of "proba mixta" (final exam).

To get a pass a student has to get a minimum of 4 points out of 10 in the Theoretical part of the course and a minimum of 4 points out of 10 in the Practical part. Moreover, a minimum of 4 points out of 10 has to be got in in the theoretical part of the "proba mixta" and also in the practical part of the "proba mixta". Moreover, in order to get the pass, the average/mean of the different parts and methodologies has to be at least 5 points out of 10.

Attendance to practicals is compulsory. If a student does not attend to one or two sessions of the practicals, he/she will have a penalty of one and two points, respectively, to be subtracted from the score of the "proba mixta". If the student does not attend to three or more sessions of the practicals, he/she will get a fail as the final score in the course.

The students that do not carry out the "proba mixta" will be qualified as "NO PRESENTADO".

## Sources of information



|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Basic</b>         | <ul style="list-style-type: none"> <li>- Benítez Burraco, A. (2005). Avances recientes en Biotecnología vegetal e ingeniería genética de plantas.. Editorial Reverté.</li> <li>- Hammond, J., McGarvey, P., Yusibov, V. (1999). Plant Biotechnology. New products and Applications. Springer verlag.</li> <li>- Loyola-Vargas, V.M. e Vázquez-Flota F. (2006). Plant cell culture protocols.. Humana Press. 2nd Edition.</li> <li>- Trigiano, R.N. e Gray, D.J. (2007). Plant development and biotechnology.. CRC Press.</li> <li>- Patrick, G.L. (2009). An Introduction to Medicinal Chemistry . Oxford</li> <li>- Papageorgiou, G.C. (2010). Chlorophyll a Fluorescence. Springer</li> <li>- Crozier, A., Clifford, M.N. &amp; Ashihara, H. (2006). Plant Secondary Metabolites. Blackwell</li> <li>- Font Quer, P. (2009). Plantas Medicinales, El Dioscórides renovado. Península</li> <li>- Ustin, S. y Gamon, J. (2010). Remote sensing of plant functional. New Phytologist (2010) 186: 795-816</li> <li>- Cobb A.H. &amp; Kirkwood R.C. (2000). Herbicides and their mechanisms of action. Sheffield Academic Press.</li> <li>- Gonzalez-Fontes, A., Garate, A. &amp; Bonilla I. (2010). Agricultural Sciences : Topics in Modern Agriculture . Studium Press LLC.</li> <li>- Hay, R.K.M. &amp; Porter, J.R. (2006). The physiology of crop yield, 2nd Edition.. Blackwell Publishing.</li> <li>- Stenersen, J. (2004). Chemical pesticides mode of action and toxicology. CRC Press</li> <li>- Taiz, L. &amp; Zeiger, E. (2010). Plant Physiology, 5th Edition.. Sinauer Associates.</li> <li>- Slater, A., Scott, N.W. &amp; Fowler, M.R. (2008). Plant Biotechnology: The Genetic Manipulation of Plants. Oxford University</li> <li>- Murphy, D (2011). Plants, Biotechnology and Agriculture.. CABI Publishers</li> </ul> |
| <b>Complementary</b> | <ul style="list-style-type: none"> <li>- De Liñán, C. (2010). Vademécum de productos fitosanitarios y nutricionales.. Ediciones Agrotécnicas.</li> <li>- Lucas, J. A. (1998). Plant pathology and plant pathogens.. Blackwell Science Ltd.</li> <li>- Sadras, V. &amp; Calderini D. (2009). Crop physiology. Applications for genetic improvement and agronomy.. Academic Press.</li> <li>- Cobb, A.H. &amp; Reade, J. (2010). Herbicides and plant physiology, 2nd edition.. Wiley-Blackwell.</li> <li>- Gianfagna, T (1995). Natural and synthetic growth regulators and their use in horticultural and agronomic crops. In: Davies, P.J. (Ed.) Plant hormones, pp 751-773.. Kluwer Academic Publishers.</li> <li>- Varios autores (2010). Guía práctica de la fertilización racional de los cultivos en España. . Ministerio de Medio Ambiente y Medio Rural y Marino.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Recommendations

### Subjects that it is recommended to have taken before

Fisioloxía vexetal: Fisioloxía vexetal I/610G02027

Fisioloxía vexetal: Fisioloxía vexetal II/610G02028

### Subjects that are recommended to be taken simultaneously

### Subjects that continue the syllabus

Resposta das plantas en condicións adversas/610G02030

### Other comments

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.