

**COURSE DATA****Data Subject**

Code	33198
Name	Molecular techniques in genetic improvement
Cycle	Grade
ECTS Credits	4.5
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1102 - Degree in Biotechnology	Faculty of Biological Sciences	4	Second term

Subject-matter

Degree	Subject-matter	Character
1102 - Degree in Biotechnology	108 - Molecular techniques in genetic improvement	Optional

Coordination

Name	Department
ESCRICHE SOLER, BALTASAR	194 - Genetics
GARCIA ROBLES, INMACULADA ROSA	194 - Genetics

SUMMARY

The subject "Molecular Techniques in Plant Breeding" is taught in the module of optional subjects in the fourth year of the Bachelor of Biotechnology. Basic knowledge about the molecular markers and their heritage, as well as concepts of population genetics will have been obtained in the core subject 2nd year called Genetics. Subjects like "Getting Transgenic Organisms" (trunk) and "food biotechnology" (optional) have descriptors with content overlapping the those of the present subject, but specifically applied to animals or microorganisms. So, considering this, the subject has been raised primarily a non-exclusive, but priority approach, focusing on plant breeding. From this perspective, the subject has been coordinated with the subject "Plant Biotechnology" (optional), with which it has certain similar descriptors, so that although there is some repetition (both are optional subjects), each subject provide different escalations.

Students should begin taking general knowledge of Molecular Biology and Genetics. The aim of this course is that the student deepens basics of breeding techniques, mainly using molecular markers.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

OUTCOMES

1102 - Degree in Biotechnology

- Determinar los marcadores moleculares apropiados en procesos de mejora con fines biotecnológicos.
- Diseñar procesos de manipulación y obtención de productos biotecnológicos.
- Analizar a nivel molecular el resultado de la manipulación de un organismo.
- Diseñar y aplicar aproximaciones biotecnológicas en el campo de la Agroalimentación.

LEARNING OUTCOMES

- Determine appropriate molecular markers in improvement processes. Designing handling processes and obtaining genetically improved organisms.
- Analyzing process at the molecular level and the result of selection of an organism. Design and implement breeding approaches in the field of agroalimentación
- Capacity to work together when facing problematic situations collectively.
- Ability to argue with rational criteria, clearly differentiating what is debatable what are facts or scientific evidence.
- Analysis and synthesis capacity.
- Create a critical attitude that allows them to issue judgments and argued vigorously defend and tolerance.
- Transmit the knowledge acquired in the subject to other professionals and laymen adapting the appropriate language to address the subject receptor.
- Ability to get obtain adequate information with which to address the scientific issues that arise.
- Ability to build a comprehensive and organized written text
- Professional training.
- Much of the contents of the course aims to develop in students the ability to confront and solve problems related to DNA, genes and genetic improvement.

DESCRIPTION OF CONTENTS

**1. Topics**

1. Introduction.
- 2 DNA markers.
- 3 Analysis of linkage with molecular markers.
- 4 Power selection by molecular markers.
- 5 Molecular markers for selection of quantitative traits.
- 6 Cartografiado markers.
- 7 Analysis of genetic variation in populations.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	21,00	100
Laboratory practices	15,00	100
Tutorials	9,00	100
Development of individual work	22,50	0
Preparation of evaluation activities	20,00	0
Preparing lectures	22,00	0
Preparation of practical classes and problem	3,00	0
TOTAL	112,50	

TEACHING METHODOLOGY

The teaching of this subject will be made through the following methodological approaches: lectures, discussion sessions organized by the contents of the syllabus of the subject tutorials and laboratory work experience.

The student must attend the lectures in which he will give an overview of the topic, especially focusing on key concepts. At the same meeting will be indicated the most suitable for a deepening of the subject resources so that students complete their training in it. As for the practical classes experiments in which the concepts developed in the theoretical classes will be planted.

The subject is devised to be developed in the form of classroom and non-contact work.

EVALUATION

The assessment of student learning assessment will be made by the following sections:

1) A written exam in single call to be held in the classroom and consisting of both knowledge questions on theory and exercises that need to be resolved, must obtain a score equal to or greater than 5 out of 10. This test will be worth 60% of the grade and will be held after the end of classes.

2) Assessment of the resolution of practical exercises by the students along the course as well as memory



care and practices. This section will be worth 30% of the grade.

3) Finally the student will have a portfolio where you will accumulate points associated with the assessment that the professor makes about his interest in the subject expressed as participation in organized discussions, the answers to the questions you ask the teacher during classroom sessions, his personal tutoring assistance and / or any other activity conducted by the student in relation to the subject. It can get up to 10% of the final grade for the course.

The final grade for the course will be the sum of that obtained in the evaluation of theoretical credits of course work and additional activities as organized discussions, as previously described relations 60%, 30% and 10% respectively. It will approve the course with a grade greater than 5 out of 10, as long as you have exceeded in paragraphs 1 and 2 score of at least 4 out of 10.

To pass the course on the second call, we must pass a written exam only similar to that proposed in section XI-1. In the event that the student had obtained a score equal to or greater than 1.5 on the practice (see chapter XI-2) these points will join the exam, which will be worth up to 7 points. In the event that the scoring tasks paragraph XI-2 is less than 1.5 or is absent, the value of the review will be up 10 points.

REFERENCES

Basic

- Acquaah, G. (2007) Principles of Plant Genetics and Breeding. Blackwell.
- Avise, J.C. (2004) Molecular markers, natural history and evolution. 2a edició. Sinauer Associates.
- Benito Jiménez, C. i Espino Nuño, F.J. (2013), Genética: conceptos esenciales, Editorial Médica Panamericana.
- Cubero, J.L. (2013) Introducción a la mejora genética vegetal. Ediciones Multi-Prensa.
- de Vienne, D. (2003). Molecular Markers in Plant Genetics and Biotechnology. Science Publishers Inc.
- Griffiths, A.J.F.; Wesier, S.R., D.T.; Lewontin, R.C. i Carroll, S.B. (2013) Genética. 9a ed. Interamericana-McGraw-Hill.
- Klug, W., Cummings, M.R. i Spencer C.A. (2013) Conceptos de Genética. Pearson Prentice Hall, 10a ed.
- Krebs, J.E.; Goldstein, E.S.; Kilpatrick, S.T.; Lewin, B. Genes XI. (2014) Burlington, Mass.
- Nuez, F. i J.M. Carrillo (ed.). (2000) Los marcadores genéticos en la mejora vegetal. Ed. Universitat Politècnica de València.
- Phillips, R.L.; Vasil, I.K. (2001) DNA-Based Markers in Plants. Advances in Cellular and Molecular Biology of Plants Vol. 6, 2a ed. Springer Verlag.
- Pierce, B.A. (2016) Genética. Un enfoque conceptual. 5a edició. Panamericana.
- Weir, B. S. (1996) Genetic Data Analysis II. Sinauer Assoc.



Additional

- Altman, A. (1998) Agricultural Biotechnology. Marcel Dekker, New York.
- Barigozzi, C. ed. (1986) The origin and domestication of cultivated plants. Elsevier.
- Benítez Burraco, A. (2005) Avances Recientes en Biotecnología Vegetal e Ingeniería Genética de Plantas. Reverté.
- Casal, I.; García-López, J.L.; Guisán, J.M.; Martínez Zapater, J.M. (2000) La Biotecnología Aplicada a la Agricultura. SEBIOT y Eumedía S.A., Madrid.
- Dieffenbach, C. L. and Dveksler, G. S. (1995) PCR primer. A laboratory manual. Cold Spring Harbor Laboratory Press.
- Earp, D., Lowe, B., and Baker, B. (1990). Amplification of genomic sequences flanking transposable elements in host and heterologous plants: a tool for transposon tagging and genome characterization. Nucleic Acids Research 18, 3271-3279.
- García Olmedo, F. (1998) La Tercera Revolución Verde. Plantas con Luz Propia. Ed. Debate, Madrid.
- Gierl, A. and Saedler, H. (1992). Plant-transposable elements and gene tagging. Plant Molecular Biology 19, 39-42.
- Goldstain, D. B. and Schlötterer eds. (1999) Microsatellites. Evolution and applications. Oxford University Press.
- Hammond, J.; McGarvey, P.; Yusibov, V. (1999) Plant Biotechnology. Springer-Verlag, Berlin.
- Hayward, M.D.; Bosemark, N.O.; Romagosa, I. (1993) Plant Breeding. Principles and Prospects. Chapman and Hall, London.
- Henry, R.J. (1997) Practical Applications of Plant Molecular Biology. Chapman & Hall, London.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available

1. Contenidos

Se mantienen los contenidos inicialmente recogidos en la guía docentes

2. Volumen de trabajo y planificación temporal de la docencia

Ya se ha impartido el 95% de sesiones presenciales. El resto se han realizado online manteniendo los



horarios establecidos.

Se mantiene el peso de las distintas actividades que suman las horas de dedicación en créditos ECTS marcadas en la guía docente original

3. Metodología docente

La docencia presencial se sustituye por videoconferencia síncrona BBC, incluyendo las clases de problemas.

Las tutorías no grupales se resuelven por correo electrónico o por videoconferencia si fuera necesario.

4. Evaluación

La adaptación a la no presencialidad dependerá de las circunstancias. Así, se realizarán pruebas objetivas y/o una prueba escrita abierta utilizando el aula virtual.

5. Bibliografía

La bibliografía recomendada se mantiene pues es accesible