Universitat Autònoma de Barcelona

2017/2018

Plant Genomics

Code: 43865
ECTS Credits: 6

Degree	Type	Year	Semester
4316231 Plant Biology, Genomics and Biotechnology	OB	0	1

Contact

Name: David Caparros Ruíz

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Use of languages

Principal working language: english (eng)

Teachers

Josep Maria Casacuberta Suñer

Merce Galbany Casals

External teachers

Albert Boronat Margosa

Prerequisites

Good command of English

Good background in genetics, molecular biology and genetic engineering

Objectives and Contextualisation

Provide a global and updated view of the theoretical and technological bases related to the study of the organization, function and evolution of plant genomes and their potential applications to the genetic improvement of crop plants.

Skills

- Apply knowledge of functional mechanisms of various different organizational levels in plants to the characterization of growth and development processes of the whole plant organism.
- Apply knowledge of plant molecular genetics in different scientific and industrial areas.
- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Continue the learning process, to a large extent autonomously.
- Develop critical reasoning in the area of study and in relation to the scientific and business environment.
- Identify and use Bio-Computer Science tools to be applied to the genetic, evolutionary and functional study of plants.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.

- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Synthesize, and analyze alternatives and debate critically.
- Use and manage bibliographical information and computer resources in the area of study.
- Use scientific terminology to argue the results of research and present them in English both orally and in writing in an international environment.
- Work in a multidisciplinary team.

Learning outcomes

1. Apply bioinformatic tools to the study of plant systems and phylogeny.
2. Apply genome sequencing and annotation strategies.
3. Apply knowledge acquired when identifying the function of new genes in basic and applied research.
4. Apply knowledge of plant genomics to the study of the evolutionary mechanisms and the systems of plants and fungi.
5. "Apply ""omic""-type approaches to the identification of new genes and processes of interest in basic and applied research."
6. Choose and apply bioinformatic tools to genomics studies.
7. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
8. Continue the learning process, to a large extent autonomously.
9. Describe the organisation and function of plant genomes.
10. Develop critical reasoning in the area of study and in relation to the scientific and business environment.
11. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
12. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
13. Synthesize, and analyze alternatives and debate critically.
14. Use and manage bibliographical information and computer resources in the area of study.
15. Use scientific terminology to argue the results of research and present them in English both orally and in writing in an international environment.
16. Work in a multidisciplinary team.

Content

-Plant genome organization and function.

-Genome sequencing strategies and annotation.

-Strategies for gene function analysis.

-Theoretical fundamentals of the main "omics" techniques used in plant genomics (transcriptomics, proteomics and metabolomics). Other "omics".

-Molecular evolution of plants.

-Bioinformatics tools applied to genomic studies.

Methodology

-Lectures covering the different topics of the program. Powerpoint presentations will be available in advance at the "campus virtual".

-Reading of selected research papers for presentation and discussion in the seminar sessions

-Practical sessions on bioinformatics tools applied to genomic studies

-Visit to the National Center for Genomic Analysis (CNAG) at Barcelona Science Park.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Lectures	33	1.32	1, 2, 3, 4, 5, 6, 9, 10, 11, 14
Type: Supervised			
Oral presentations	30	1.2	6, 7, 15
Type: Autonomous			
Student work and learning	86	3.44	8, 10, 12, 13, 16

Evaluation

-Written reports (Exam and exercises on bionformatics)

-Oral presentation and defense of seminar session

-Attendance and participation in the classroom and seminar sessions

-The student will be "not qualificable" when the mark of the different evaluations does not reach a global minimal qualification of 5.0 (out of 10).

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Attendance and participation in the classroom and seminar sessions	10%	0	0	10, 13, 16
Oral presentation and defense of seminar session	30%	0	0	7, 11, 13, 14, 15
Written reports (Exam and exercises on bionformatics)	60%	1	0.04	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 15

Bibliography

Specific bibliography (books, book chapters and journal publications) and useful links related with Plant Genomics will be provided for the different sessions of the program.