

Plant Systems Biology

Code: 44787
ECTS Credits: 6

Degree	Type	Year	Semester
4318297 Plant Biology, Genomics and Biotechnology	OT	0	2

Contact

Name: Ana Montserrat Martin Hernandez

Email: anamontserrat.martin@uab.cat

Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Luisa Maria Lois Rojas

Juan Jose Lopez-Moya Gomez

Elena Monte Collado

External teachers

Iban Eduardo

Jae-Seong Yang

Martí Quevedo

Prerequisites

Basic knowledge of Genetics

Objectives and Contextualisation

To provide students with a comprehensive and current view of the techniques, fundamentals and applications of Plant Genomics and introduce systems biology of plants. The specific objectives include understanding the following aspects: the diversity and complexity of plant genomes, the techniques commonly used in genomics, transcriptomics, proteomics and metabolomics studies and applications to the genetic improvement of crop plants. Use of mathematics for predictive modeling through integration of different omics data.

Learning Outcomes

- CA12 (Competence) Use new bioinformatic tools to describe predictive models of experimental omics data in the fields of Plant Biology, Genomics and Biotechnology.
- CA17 (Competence) Apply scientific terminology to argue the results of research in terms of the genetic improvement of crop plants and communicate them orally and in writing in an international environment.
- KA15 (Knowledge) Describe the results of data analysis derived from proteomic and metabolomic studies applied to crop breeding.
- KA16 (Knowledge) Select study methodologies in plant genomics and case studies across multiple omics data.
- SA28 (Skill) Communicate research results in the field of Plant Biology, Genomics and Biotechnology in English orally and in writing using appropriate scientific terminology.
- SA29 (Skill) Apply knowledge of molecular genetics and plant breeding in different scientific and industrial fields.
- SA30 (Skill) Apply the methods and techniques commonly used in genomic, phenomic, transcriptomic, proteomic and metabolomic studies.
- SA31 (Skill) Apply bioinformatic tools to the genetic, evolutionary and functional study of plants and interpret the results obtained from the experiments carried out.

Content

Systems Biology: Concepts, methodology, and case studies using multiple omics.

The case study will be the emergence of a new disease affecting and killing all tomato varieties. The students will make a trip through all the -omics to unveil the cause and search for a scientific solution feasible for application in crop plant breeding.

Specifically,

We will use practical applications of methods and techniques in plant phenomics and genomics, including the use of molecular markers in breeding. Importance of QTL in this problem.

Analysis and application of data arising from genomics and transcriptomics studies to narrow down the problem.

Analysis and application of data arising from proteomics, interactomics, and metabolomics studies to find a solution to the problem.

Integrative analysis of the case study applied, including Computational modelling, to crop plant breeding.

Methodology

Lectures and Expert talks
Problems and case studies
Preparation of reports.

Personal study

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			

Lectures and expert's talks	12	0.48	CA12, KA16, SA28, SA30, CA12
Problems and case studies	18	0.72	CA17, KA16, SA28, SA29, CA17
Type: Supervised			
Preparation of reports	35	1.4	CA17, KA15, SA28, CA17
Type: Autonomous			
Personal study	84	3.36	SA31, SA31

Assessment

Continuous evaluation 10%

Report 60%

Final Quiz 30%

This subject/module does not include the single assessment system.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final quiz	30%	1	0.04	SA29, SA30, SA31
Lectures and expert's talks	Continuous evaluation of students participation	0	0	CA12, CA17, KA16, SA29, SA30, SA31
Report	60%	0	0	CA17, KA15, SA28, SA29, SA30, SA31

Bibliography

Yunbi Xu Molecular Plant Breeding. CAB International Oxfordshire, UK disponible online a Biblioteca UAB :<http://www.cabi.org/cabebooks/FullTextPDF/2010/20103101750.pdf>
Articles and specific reviews recommended during classes

Software

MapQTL 6.0

JoinMap 5.0

R

RStudio