



PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	2nd semester (01/03/2020 - 14/06/2020)
ECTS	6
Language	English

The activity is split

504226 - PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY - I

504227 - PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY - II



PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY - I

Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Academic discipline	BIO/04 (PLANT PHYSIOLOGY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	(01/03/2020 - 14/06/2020)
ECTS	3
Lesson hours	24 lesson hours
Language	English
Activity type	ORAL TEST
Teacher	BALESTRAZZI ALMA (titolare) - 1.5 ECTS BALESTRAZZI ALMA (titolare) - 1.5 ECTS DE SOUSA ARAUJO SUSANA - 1.5 ECTS
Prerequisites	Basic knowledge in Molecular Biology, Cellular Biology and Genetics
Learning outcomes	<p>The course is organized in such a way that the students will be able to develop the following competences:</p> <ol style="list-style-type: none">1. Acquire knowledge on the molecular aspects of plant meristem activity and key molecular players (genes, proteins, phytohormones) in plant totipotency, biotechnological application of genetic engineering in the agricultural and industrial context; understand the value of molecular processes/techniques and their use to address the challenges of the 21st century2. Understand how to combine the value of basic research in plant molecular biology with applied research in the fields of agriculture and

industry; learn how to use virtual materials to develop a model for molecular cloning and genetic transformation of plants

3. Develop autonomous evaluation skills in view of critically analyzing the scientific literature, evaluate published results, and critically interpret and communicate the outcome of scientific researches
4. Develop communicative skills through the use of interactive instruments supported by the thematic of the course
5. Develop the ability to understand and interpret the presented information in the context of the course thematic

Course contents

Module I: Plant Molecular Biology (Alma Balestrazzi). This part of the course aims at highlighting the molecular aspects of plant meristem activity and key molecular players (genes, proteins, phytohormones) in plant totipotency. Molecular aspects of plant cell totipotency. Shoot and root apical meristems (SAM, RAM): identity, activity, response to stress. Invited Lectures (Susana Araùjo): 'omics' techniques applied to plants. Module II: Plant Biotechnology (Anca Macovei). This part of the course aims at highlighting the importance of plant biotechnology techniques, providing past and current approaches in plant genetic modification (GM) technology of high impact for the agro-economic sectors. Molecular farming: use of plants for the production of relevant biomolecules for the pharmaceutical and industrial sectors.

Teaching methods

The course is divided in two integrated modules – Plant molecular biology and Plant Biotechnology. The course will involve the use frontal lessons supported by interactive methods like case-studies, simulations, cooperative learning, brainstorming, project work.

Reccomended or required readings

scientific articles and pdf presentations provided by the teacher

Assessment methods

The examination is proposed via two methods: a project in which the students working in teams are asked to write an essay on a given topic, and an oral examination where the students can choose a topic of their interest (different than the topic of the essay) from the materials presented during the lessons. For the teamwork activity, groups of 4 students will be formed and they should work together to write an essay of maximum 10 pages following the guideline instructions given in the introductory lessons. The topics of the essay cover the thematic discussed during the lessons. Both the formation of the groups and the choice of essay topics are randomized. This methodology was chosen in order to promote the teamwork between students and develop their ability to communicate, evaluate scientific articles, form opinions, and pertinently discuss their opinions. The evaluation criteria will take in consideration the creativity, scientific accuracy, clarity and structure of the essay, quality of the teamwork.

Further information

Sustainable development goals - Agenda 2030

[\\$|bl legenda sviluppo sostenibile](#)



PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY - II

Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Academic discipline	BIO/04 (PLANT PHYSIOLOGY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	(01/03/2020 - 14/06/2020)
ECTS	3
Lesson hours	24 lesson hours
Language	English
Activity type	ORAL TEST
Teacher	MACOVEI ANCA - 3 ECTS
Prerequisites	Knowledge of Plant Biology, Molecular Biology and Genetics
Learning outcomes	<p>The course is organized in such a way that the students will be able to develop the following competences:</p> <ol style="list-style-type: none">1. Acquire knowledge on the molecular aspects of plant meristem activity and key molecular players (genes, proteins, phytohormones) in plant totipotency, biotechnological application of genetic engineering in the agricultural and industrial context; understand the value of molecular processes/techniques and their use to address the challenges of the 21st century2. Understand how to combine the value of basic research in plant molecular biology with applied research in the fields of agriculture and industry; learn how to use virtual materials to develop a model for molecular cloning and genetic transformation of plants

3. Develop autonomous evaluation skills in view of critically analyzing the scientific literature, evaluate published results, and critically interpret and communicate the outcome of scientific researches
4. Develop communicative skills through the use of interactive instruments supported by the thematics of the course
5. Develop the ability to understand and interpret the presented information in the context of the course thematic

Course contents

Module I: Plant Molecular Biology (Alma Balestrazzi). This part of the course aims at highlighting the molecular aspects of plant meristem activity and key molecular players (genes, proteins, phytohormones) in plant totipotency. Molecular aspects of plant cell totipotency. Shoot and root apical meristems (SAM, RAM): identity, activity, response to stress. Invited Lectures (Susana Araùjo): 'omics' techniques applied to plants. Module II: Plant Biotechnology (Anca Macovei). This part of the course aims at highlighting the importance of plant biotechnology techniques, providing past and current approaches in plant genetic modification (GM) technology of high impact for the agro-economic sectors. Molecular farming: use of plants for the production of relevant biomolecules for the pharmaceutical and industrial sectors.

In agreement with the objectives of Agenda 2030 for Sustainable Development, the following objectives will be covered: Objective 2 (Zero hunger), Objective 13 (Climate Action).

Teaching methods

The course is divided in two integrated modules – Plant molecular biology and Plant Biotechnology. The course will involve the use frontal lessons supported by interactive methods like case-studies, simulations, cooperative learning, brainstorming, project work.

Reccomended or required readings

Specialized articles on international scientific journals are suggested instead of text books

Assessment methods

The examination is proposed via two methods: a project in which the students working in teams are asked to write an essay on a given topic, and an oral examination where the students can choose a topic of their interest (different than the topic of the essay) from the materials presented during the lessons. For the teamwork activity, groups of 4 students will be formed and they should work together to write an essay of maximum 10 pages following the guideline instructions given in the introductory lessons. The topics of the essay cover the thematics discussed during the lessons. Both the formation of the groups and the choice of essay topics are randomized. This methodology was chosen in order to promote the teamwork between students and develop their ability to communicate, evaluate scientific articles, form opinions, and pertinently discuss their opinions. The evaluation criteria will take in consideration the creativity, scientific accuracy, clarity and structure of the essay, quality of the teamwork.

Further information

Sustainable development

