SYLLABUS

1. COURSE DESCRIPTION

Degree:	**Biotechnology**
Course:	**Plant Biotechnology**
Module:	**Bioengineering and Biotechnological Processes. Biological Systems**
Department:	**Physiology, Anatomy and Cell Biology**
Academic Year:	**2016/17**
Term:	**First**
ECTS credits:	**4,5**
Year:	**3rd year**
Type:	**Compulsory**
Language:	**Spanish**

Course Model:	**A2**
a. Basic learning (EB):	**70%**
b. Practical learning (EPD):	**15%**
c. Guided Academic Activities (AD):	**15%**

SYLLABUS

2. LECTURERS

2.1. Coordinator: Juan Camacho Cristóbal

2.2. Lecturers	
Name:	**Juan Camacho Cristóbal**
School:	**School of Experimental Sciences**
Department:	**Physiology, Anatomy and Cell Biology**
Area:	**Plant Physiology**
Office Hours:	**Tuesdays (10-14 h and 15-17 h).** **Previous appointment through e-mail.**
Office:	**22-1-13**
E-mail:	**jjcamcri@upo.es**
Phone:	**954977636**

3. TOPICS

3.1.- BASIC LEARNING (24 HOURS)

Topic I: CLASSICAL PLANT IMPROVEMENT

Unit 1: **Classical Plant Biotechnology.** Traditional Biotechnology and Modern Biotechnology. Classical plant improvement. Traditional plant improvement techniques: selection, artificial crossbreeding, mutagenesis and in vitro breeding.

Unit 2: **In vitro breeding.** In vitro morphogenesis: organogenesis and somatic embryogenesis. Increase in genetic variability: somaclonal variation. In vitro breeding application in the improvement of plants.

Unit 3: **Molecular markers and plant improvement.** Polymorphism in the DNA sequence: use of molecular markers. Molecular markers application.

Topic II: GENETIC ENGINEERING AND VASCULAR PLANTS TRANSFORMATION

Unit 4: **Obtaining transgenic plants I**. Stable genetic transformation of plants: requirements and transformation methods. Obtaining transplastomic plants. Non-integrating expression systems: transient expression.

Unit 5: **Obtaining transgenic plants II**. Selectable marker genes and information. Trasgene expression. Trasgene detection techniques and results.

Topic III: BIOTECHNOLOGICAL APPLICATION OF TRANSFORMED PLANTS

Unit 6: **Biotechnology applied to the control of diseases caused by fungi, bacteria and viruses.** Defensive mechanisms of plants. Obtaining resistance to fungi, bacteria and viruses through genetic engineering.

Unit 7: **Biotechnology applied to the control of insect pests.** Traditional insecticides. Bacterial, animal and plant resistance genes. Environmental problems.

Unit 8: **Biotechnology applied to weed control.** Herbicides. Xenobiotics metabolism in plants. Resistance to herbicides. Considerations on the use of herbicide-resistant crops.

Unit 9: **Biotechnology applied to resistance to abiotic stresses.** Abiotic stresses Tolerance to abiotic stress: osmotic adjustment. Biotechnology applied to resistance to water, salt and low temperature stresses.

Unit 10: **Phytoremediation.** Mechanisms of absorption and accumulation of metals. Phytoremediation: Types of phytoremediation. Biotechnology applied to phytoremediation.

Unit 11: **Metabolic engineering.** Genetic manipulation of the primary metabolism. Genetic manipulation of secondary metabolism.

Unit 12: **Plants as bioreactors.** Plants as bioreactors: advantages and limitations. Technological strategies to optimize the obtaining of recombinant proteins in plants. Applications.

5.2.- PRACTICAL LEARNING (5 HOURS)

During the course, the following practices will take place:

- Practice 1. Transformation of plants with *Agrobacterium tumefaciens*.
- Practice 2. Homozygous and heterozygous insertional mutants identification in *Arabidopsis thaliana* plants.

5.3.- GUIDED ACADEMIC ACTIVITIES (5 HOURS)

These sessions will help to expand the adquired knowledge from EB and EPD.