Code: 1337 **Plant Biotechnology**
Degree: 2nd cycle – Agriculture
Stream: All
Curricular Year: 1st **Semester Course: 1st**
Credits: 6 ECTS **Compulsory**
Language: Portuguese/English
Responsible: Sara Barros Queiroz Amâncio
Other lecturer(s): Maria Leonor Mota Morais Cecílio, Cristina Maria Moniz Simões Oliveira, Jorge Alexandre Matos Pinto de Almeida and Maria Luísa Lopes de Castro e Brito
Web Site: http://www.isa.utl.pt/home/node/3775

1. Contact hours:
Lectures 32 **Lecture/Practicals** 18 **Praticals/Laboratory** 20 **Others** 14 **Total** 84

2. Objectives:

To introduce the students to the subject "Plant Biotechnology";
To supply to our students the elements necessary to understand and apply recent knowledge on Genomics of Eukaryotes, Molecular Markers and their applications in Agriculture (marker assisted selection, plant pathogen diagnosis, yield and quality, etc);
To forward theoretical and practical information on Gene Transfer and gene Expression; Plant Regeneration by in vitro Tissue Culture;
To stimulate independent research and discussion of new information

3. Programme:

Plant Biotechnology: Introduction, concepts, applications
1. Genomics of eukaryotes: anatomy of eukaryote genomes; Comparative analysis of plant genome; Gene silencing. RNAi mechanism. Applications in biotechnology
2. Molecular markers: Techniques for obtaining molecular markers. Description of the main molecular marker systems. Applications of MM in agriculture – Identification of varieties; Phenetic and phylogenetic diversity; Diagnosis of pathogens; Marker Assisted Selection
3. Gene transfer methods and gene expression:
In bacteria
In plants
Detection of gene expression
4. Plant Regeneration by Tissue Culture methods. Adventitious Organogenesis; Somatic Embryogenesis. Protoplasts: Isolation, culture and fusion; Somaclonal variation: concepts, advantages and limitations. Main applications of Tissue Culture techniques.

4. Bibliography:

Main Bibliography

An Introduction to Genetic Analysis, Seventh Edition (2000) A.J.F. Griffiths, J.H. Suzuki, R.C. Lewontin, W.M. Gelbart, W. H. Freeman and Company, N.Y. (BISA Z 30 – 345, 346, 347)
Molecular Biotechnology. Principles and Applications of Recombinant DNA (1998) B. R Glick, J.J. Pasternak, ASM Press, Washington (BISA Z 30 – 408).

Recombinant DNA, Second edition (1991) J.D Watson, M.Gilman, J. Witkowski and M. Zoller. Scientific American books. W. H. Freeman and Company. N.Y
Engenharia Genética, Princípios e Aplicações (2001) Arnaldo Vieira (coordenação), LIDEL, Lisboa, pp. 168 (BISA Z 30 - 443).
Biotecnologia, Fundamentos e Aplicações (2003) Lima N., Mota M. (coord) LIDEL, Lisboa, pp. 505
Cap. VII Engenharia Genética, Sá-Correia I., Moreira L.M., Fialho A.M., p.125-161
Cap. XIX Biotecnologia Vegetal, Pais M.S.S., p. 401-427
Cap. XXI Segurança e Regulamentação em Biotecnologia, Amaral-Collaço M.T., Esteves M.P., Duarte L.C., p. 475-494

Other Bibliography

According to the main points of the Programmme:

1. Napoll, C., Lemieux, C., and Jorgensen, R. (1990). Introduction of a chimeric chalcone synthase gene into petunia results in reversible co-suppression of homologous genes in trans. Plant Cell 2, 279-289.

Dorsett Y, Tuschl T. (2004) siRNAs: applications in functional genomics and potential as therapeutics. Nat Rev Drug Discov. Apr;3:318-29.

Matzke MA, Birchler JA. 2005 RNAi-mediated pathways in the nucleus. Nat Rev Genet. Jan;6(1):24-35.

2. Los Marcadores Genéticos en la Mejora Vegetal (2000) F. Nuez, J.M Carrillo, Sociedad Espanola de Genética e Sociedad Espanola de Ciencias Hortícolas;

4. Introduction to Plant Biotechnology (2000) H. S. Chawla, Science Publishers, Inc., Plymouth, UK, (BISA F 30 – 435, 436, 437, 438);

5. Assessment:

1. Tutorial assessment (T)
1.1. Two Module tests, 25% (a)
1.2. Queries, Reports, Problems, 10% (b)
1.3. Individual essay and oral presentation (20%), (c)
1.4. Tutorial mark: (T) = (a) + (b) +(c)
(T) $\geq$ 12/20 can substitute for writing a final exam
2. Exam
Exam mark =minimum 50% (E)
Final mark (F) = 55% T + 45% (E)

6. Estimated Workload:	168	Hours
7. Last Update:	19/7/2010	