

Code: 1665 Biotechnology**Degree:** 1st cycle - Biology**Curricular Year:** 3rd**Credits:** 6 ECTS**Semester Course:** 2nd
Compulsory**Language:** Portuguese/English**Responsible:** Sara Barros Queiroz Amâncio**Other lecturer(s):** Maria Luísa Lopes de Castro e Brito, Jorge Alexandre Matos Pinto de Almeida and Maria Leonor Mota Morais Cecílio**Web Site:** <http://www.isa.utl.pt/home/node/3974>**1. Contact hours:****Lectures 35 Practicals/Laboratory 35 Others 14 Total 84****2. Objectives:**

At the end of course the students must:

Integrate Biology scientific and technological knowledge;

To have acquired experimental competence in the different Biotechnology streams: microbe, animal and plant biotechnology,

To understand and set up practical problems; to search information independently; to be able to design problem solving procedures.

3. Programme:

- Biotechnology : Introduction, concepts, applications. References to Bioeconomy

- Mechanisms of RNAi and gene silencing. Case studies.

- Microbiological Biotechnology:

+ Gene transfer in prokaryotes

+ Yeast as biotechnological tool

+ Fermentation: Processes and products. processes upstream and *downstream* ,

+ Biorreactors

+ Case studies (Seminars)

- Animal Biotechnology

+ Applying animal cells to evaluate bacterial virulence

+ Production of complex biofarmaceutics

Recombinant proteins

Vaccins,

VLP's,

Vectors for gene therapy,

+ Cells for cell therapy

-Plant Biotechnology

+ Gene transfer in higher plants

+ Cloning and regeneration of plants by tissue culture

+ Regeneration by adventitious Organogenesis

+ Somatic Embriogenesis: applications, cryopreservation and genetics stability control

4. Bibliography:**Main Bibliography**

Biotechnology for beginners (2008) Renneberg, R. & Demain, A.L. (eds.) Academic Press, Amsterdam (NL) (BISA Z38-43);

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, Cap. VII Engenharia Genética, Sá-Correia I., Moreira L.M., Fialho A.M., p.125-161

Other Bibliography

Mecanismos de RNAi e silenciamento de genes

Napoli, 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.

Biotecnologia animal

Paula M Alves, Pedro E Cruz, Manuel JT Carrondo Culturas de Células Células Animais in *"Tecnologia de Cultivo de Células Animais: de Biofármacos a Terapia Gênica"* Moraes AM, Augusto EFP, Castilho LR (Eds.), in press

John R. Birch, Andrew J. Racher (2006) Antibody production *Advanced Drug Delivery Reviews* 58: 671– 685

TB Ferreira, PM Alves, JG Aunins and MJT Carrondo (2005) Use of adenoviral vectors as veterinary vaccines *Gene Therapy* 12: S73–S83

Biotecnologia vegetal

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

5. Assessment:

Tutorial assessment (T)

Two Intermediate queries, QI, 45%, (a)

Queries, Reports, Problems, 25%, (b)

Individual essay and oral presentation, 30%, (c)

Final tutorial assessment $T = (a) + (b) + (c)$

$T > 60\%$ (12/20) can substitute for writing a final exam

If $T < 12/20$

Exam

Exam mark = minimum 50% (E)

Final mark (F)

(F) = 50% (E) 50% (T)

6. Estimated Workload:

168	Hours
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7. Last Update:

7/7/2010
