Code: 1752 **Organic Chemistry and Biochemistry**
Degree: 1st cycles – Agriculture; Food Science and Engineering; Environmental Engineering; Forestry and Natural Resources; Animal Production Engineering
Curricular Year: 1st **Semester Course: 2nd**
Credits: 6 ECTS **Compulsory**
Language: Portuguese/English
Responsible: Maria Luísa Louro Martins
Other lecturer(s): Miguel Pedro de Freitas Barbosa Mourato, Cláudia Saramago de Carvalho Marques dos Santos Cordovil, Henrique Manuel Filipe Ribeiro, David Paulo Fangueiro and Maria del Rosario Basanta Cornide
Web Site: http://www.isa.utl.pt/home/node/3981and http://www.isa.utl.pt/dqaa/disciplinas.htm

1. Contact hours:
Lecture/Praticals 70 **Others** 14 **Total** 84

2. Objectives:

Knowledge of main functional groups, understand functional reactivity. Identify and use correctly the nomenclature of organic compounds.
Knowledge of biomolecules structure, biological function.
Introduction to the basic aspects of catabolism, anabolism, and study of the main pathways of primary metabolism. Study of degradation and synthesis of the main biomolecules in living organism: proteins, glucids, lipids.
Testes, oral presentations, exercises, laboratory experiments are used for full discussion, to apply the subjects studied and acquire also soft skills.

3. Programme:

Module 1: Organic Chemistry
Carbon compounds and chemical bound. Representative carbon compounds. Intermolecular forces, phisical properties, solubility. Stereochemistry. Nomenclature. Organic reactions and mechanisms of functional groups. Acids and bases, nucleophilic substitution, elimination, addition, radical reactions, oxidation-reduction. Reactivity of unsaturated compounds, aromatic compounds, alcohols, carbonyl compounds, aldehydes, ketones, carboxylic acids, amines.

Module 2: Biochemistry and metabolism
Biomolecules. Amino acids, peptides, proteins, glycids, lipids. High energy compounds. Structural characteristics, biological functions, functional role in cell components and metabolism, cell membranes, chloroplast and mitochondria.
Metabolism, main pathways, regulation. Enzyme conformation and enzyme kinetics. Effect of substrate concentration, temperature and pH on enzymatic activity and stability. Enzyme inhibition. Enzyme regulation. Cofactores, coenzymes, vitamins.
Metabolic strategies, metabolic pathways, regulation. Metabolism of carbohydrates, lipids, nitrogen-containing compounds, in animals and plants. Synthesis and degradation processes, energetic balance. Metabolic interaction of proteins, glycids, lipids.

4. Bibliography:

Main Bibliography

- "Organic Chemistry" Solomons, T.W.G., John Wiley & Sons, 1996 (6th edition)
- "Nomenclatura dos compostos orgânicos". L.S. Campos, M. Mourato, Escolar Editora, 2002.
- "Bioquimica-Organização Molecular da Vida". A. Quintas, A. Ponces Freire, M. J. Halpern, Lidel, 2008
- "Concepts in Biochemistry". R. Boyer, John Wiley & Sons 2002, 2nd edition.

Other Bibliography

- "Entender a Bioquímica". Luís S. Campos, Escolar Editora, 2002.
- "Biochemistry". G. Zubay, Wm. C. Brown Pub., 1998.
- "Plant Physiology". Taiz, L. Zieger, E. Third Edition. Sinauer Associates. Inc. 2002.
- "Biochemistry". L. Stryer, W.H.Freeman and Co., 1995.
- "Guia do Laboratório de Química e Bioquímica". J.A.M.Simões, M.A.R.B.Castanho *et al.*, 2000, Lidel.

5. Assessment:

Continous assessment includes 3 mid-term tests (60%), laboratory group reports after each laboratory experiment (15%), and individual oral presentations (25%) for application of the subjects studied.
A final examination is mandatory for students that have not reached a final classification of 10 out of 20 (in the test) or 10 out of 20 in global assessment.

6. Estimated Workload: 168 Hours
7. Last Update: 25/2/2011