Code: 1585 **Biofuels**
Degree: 2nd cycle – Forestry and Natural Resources; Bioenergy Systems Engineering
Stream: Forestry and Natural Resoures - Forest Products
Curricular Year: 1st **Semester Course: 2nd**
Credits: 6 ECTS **Compulsory**
Language: Portuguese/English
Responsible: Helena Margarida Nunes Pereira
Other lecturer(s): Ana Cristina Ferreira da Cunha Queda, Elizabeth da Costa Neves Fernandes d'Almeida Duarte and Maria Suzana Leitão Ferreira Dias Vicente
Web Site: http://www.isa.utl.pt/home/node/3841

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

2. Objectives:

Characterization of biomass as an energy raw-material, of biomass conversation technologies for energy purposes, and critical assessment on biofuels economy and their technical and environmebntal feasibility.

3. Programme:

Concepts in energy and renewable energies. Types of biomass, potential and energetic properties. Characterization of plant biomass. Biomass as a solid fuel. Thermochemical processes for biomass conversion: combustion, charcoal production, gasification and pyrolysis of lignocellulosics. Anaerobic digestion. Vegetable oils as fuels: biodiesel production. Energy crops. Biomass powered heat and electricity plants. Environmental and economic aspects of bioenergy.

4. Bibliography:

Main Bibliography

Richardson J., R. Björheden, P. Hakkila, A.T. Lowe and C.T. Smith (2002) *Bioenergy from Sustainable Forestry – guiding principlies and practice.* Kluwer Academic Publishers
Sofer, S.S., O.R. Zaborsky (1981). Biomass conversion processes for energy and fuels, Plenum Press, New York
Biofuels. Application of biologically derived products as fuels or additives in combustion engines, European Commission, DG XII (1993)
Staiss C. & H. Pereira (2001). "Biomassa – Energia renovável na agricultura e no sector florestal" *Ingeniun*, 2ª série N.º 61, Set 2003, págs. 68-72.

Other Bibliography

Bridgwater, A.V., G. Grassi (1991) Biomass pyrolysis liquids upgrading and utilization, Elsevier Appl. Sci. London

5. Assessment:

Final work and presentation

6. Estimated Workload: 168 Hours

7. Last Update: 21/7/2010