

Code: 1776 Waste Usage**Degree:** 2nd cycle – Bioenergy Systems Engineering**Curricular Year:** 1st**Semester Course:** 2nd**Credits:** 6 ECTS**Compulsory****Language:** Portuguese/English**Responsible:** Henrique Manuel Filipe Ribeiro**Other lecturer(s):** -**Web Site:** <http://www.isa.utl.pt/home/node/3921>**1. Contact hours:****Lectures 30 Practicals/Laboratory 40 Others 14 Total 84****2. Objectives:**

Acquisition of knowledge, skills and competencies on: the legal framework of using waste for energy production, the quantity and properties of the main wastes produced in Portugal, Europe and the world, the characteristics and final disposal of wastes resulting from biofuels production.

3. Programme:

- Introduction: general considerations, waste management policies, from the 3/4 Rs strategy to the hierarchy of waste management, waste to energy strategy.

- Defining waste, by-product and biomass: general, evolution of the waste concept, waste versus by-product, waste versus biomass. Legal definitions: the European Waste Framework Directive and the National Waste Framework Law. Wastes classification, the legal basis of waste classification, classification by physical state, origin, properties and risk, the European Waste Catalogue, waste classification according to the OECD, UNEP, EPA and the Basel Convention.

- Assessment of the wastes produced in Portugal, Europe and the world, able to produce energy: definition, production, physical and chemical composition, methods of characterization, strategic plans. Municipal solid wastes, sewage sludge, industrial wastes, agricultural wastes, waste from livestock production, agro-industry wastes. Forest wastes, characterization of the Portuguese forest, forest biomass: (concepts, availability and accessibility), quantification of forest biomass, restrictions on the use of forest biomass, the role of forest biomass in the National Energy Strategy

- Wastes from biofuels production: characteristics and disposal.

- Case studies

4. Bibliography:**Main Bibliography**

Oliveira, JFS et al., 2009 - Resíduos, gestão, tratamento e sua problemática em Portugal. Lidel, Edições Técnicas Lda.

Dias, J, Bakken, P, 2005 – Solid waste management. United Nations Environment Program.

Pongrácz, E. 2002 – Re-defining the concepts of waste and waste management. Department of Process and Environmental Engineering, University of Oulu.

Other Bibliography

- Waste Framework Directive – Directive 2008/98/CE, 19 November 2008

- Communication from the Commission of 7 December 2005 - Biomass Action Plan [COM(2005) 628 final - Official Journal C 49 of 28.02.2005].

5. Assessment:

Exam (40%)

Reports of practical classes (20%)

Oral presentation (20%)

Paper (20%)

6. Estimated Workload:

168

Hours

7. Last Update:

21/7/2010