

<b>Code:</b>	1532	<b>Course name:</b>	Solid Waste Treatment Technologies	
<b>Degree:</b>	2 <sup>nd</sup> cycle	Environmental Engineering	<b>Branch:</b>	
<b>Curricular Year:</b>	1 <sup>st</sup>	<b>Semester course:</b>	2 <sup>nd</sup>	
<b>Credits ECTS:</b>	6	<b>Compulsory/Optional:</b>	Optional	
<b>Language:</b>	Portuguese/English			
<b>Responsible:</b>	Ana Cristina Ferreira da Cunha Queda			
<b>Lecturer(s):</b>	Elizabeth da Costa Neves Fernandes d'Almeida Duarte			
<b>Web site:</b>	<a href="http://www.isa.utl.pt/home/node/3789">http://www.isa.utl.pt/home/node/3789</a>			

#### 1. Contact hours:

Lectures	28	Lectures/Practical	14	Practical/ Laboratory	28	Others	14	Total	84
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#### 2. Objectives:

To achieve knowledge of treatment practices of urban, agri-food, industrial, hazardous, sludges and other wastes: classification and treatment/valorization according to the actual policy instruments and best available technologies. Students should be able to: identify and characterize the main waste streams and the principal pollutants; describe the principles of physical, chemical and biological processes for the solid waste treatment; propose treatment solutions and assess their efficiency.

#### 3. Programme:

1 – Origin, characteristics and properties of solid waste  
1.1 Classification of organic waste according their origin  
1.2 Classification of organic waste according their characteristics  
1.3 Physical, chemical and biochemical properties of solid waste  
2 – Physical, physic-chemical and chemical processes for solid waste treatment  
2.1 Manual and mechanical separation  
2.2 Incineration e co-incineration  
2.3 Pyrolysis and plasma technology  
2.4 Hydrolysis  
2.5 Drying and densification  
3 – Advanced biological processes for solid waste treatment  
3.1 Aerobic  
3.2 Anaerobic  
3.3 Combined aerobic/anaerobic  
3.4. Other biological processes  
4 – Key parameters for the assessment of efficiency and selection of waste treatment technologies.  
Case Study: Integration of Mechanical Biological Treatment (MBT) and Biological Mechanical Treatment (BMT) in a Municipal Solid Waste System  
Practical classes, laboratorial classes, case studies and study visits

#### 4. Bibliography:

##### Main bibliography

Queda C 2010. Origem, características e propriedades dos resíduos sólidos. AEISA.  
Queda C 2010. Processos físicos e químicos de tratamento de resíduos. AEISA.  
Queda C 2010. Processos biológicos avançados de tratamento de resíduos. AEISA.  
Queda C 2010. Guia de Métodos de Análise Laboratorial. AEISA.  
Diaz L, Bakken P 2005. Solid waste management. CalRecovery.  
Tchnobanoglous G, Theisen H, Vigil S 1993. Integrated solid waste management. McGraw-Hill.  
Williams P 2005. Waste Treatment and Disposal. Wiley.

##### Other bibliography

DG Env.A.2. 2001. Biological treatment of biowaste, Working document of biological treatment - 2nd Draft. DIRECTORATE-GENERAL ENVIRONMENT, Brussels, 12th February.  
Anónimo 2008. Especificações Técnicas sobre Qualidade e Utilizações do Composto.  
Martinho MGM, Gonçalves MGP 1999. Gestão de resíduos. Universidade Aberta, Lisboa.  
Silveira A, Centeno MSL, Cunha Queda AC 2005. Compostagem de lamas de ETARs de agro-indústrias. Série Resíduos 2, FCT, UNL.

#### 5. Assessment:

Students will be evaluated in 2 components:

- Final theoretical exam or midterm theoretical tests (80% of final mark);
- An oral presentation/seminar (15-20 min) about on a sound practice technology carried out individually or in groups of two students (20% of final mark).

**6. Estimated workload (hours):** 168

**7. Last update:** 08/02/2013