Code: 1405 **Integrated Watershed Management**
Degree: 2nd cycle – Environmental Engineering
Stream: all
Curricular Year: 2nd **Semester Course: 1st**
Credits: 6 ECTS **Optional**
Language: Portuguese/English
Responsible: Rui Marçal Campos Fernando
Other lecturer(s): Jorge Manuel Martins Soares David and José Luís Monteiro Teixeira
Web Site: http://www.isa.utl.pt/home/node/3801

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

2. Objectives:

- to explain the concept of integrated water resources management;
- to understand environmental interactions between upstream and downstream catchment parts;
- to understand the interdependencies between water use and management at different location in the catchment;
- to asses performances of hidraulic systems with multiple criteria and objectives formulated by different stakeholders;
- translation of gained insight in catchment functioning into measures and strategies for the improvement of land and water management

3. Programme:

Principles of integrated water resources management. Interactions between environment, agriculture, industry and urban water use and waste-water. Institutional framework of water resources management in national and international watersheds.
in the context of watersheds. Water allocation mechanisms. Evaluation of demand, uses e consumptions. Water competition between sectors and water use efficiency.
Management of land and water in upland watersheds. Management of reservoirs and protection plans. Management of environmental flows and sediment transport.
Water quality management. Evaluation of ecological and chemical status of surface water and groundwater. Management and protection of water abstraction, storage and delivery systems. Methods and models for groundwater use.

4. Bibliography:

Main Bibliography

Water resources systems planning and management - an introduction to methods, models and applications. D. P. Loucks; E. van Beek. Studies and Reports in Hydrology series, UNESCO 2005, 978-92-3-103998-0
Water allocation mechanisms: principles and examples. A. Dinar, M. Rosegrant & R.Meinzen-Dick
The World Bank, Policy Research Working Paper Series nº 1779. (1997)

Other Bibliography

Controlo de perdas de água em sistemas públicos de adução e distribuição. H. Alegre, S. Coelho, M.C. Almeida; P. Vieira. 2005. LNEC, Lisboa
Planos de segurança de água para consumo humano. J. Vieira, C. Morais, C. Casimiro. 2005. Guia técnico nº7 IRAR
Legislação Nacional da Água
Protecção da qualidade da água subterrânea: um guia para empresas de abastecimento de água, órgãos municipais. e agências ambientais. S. Foster, R. Hirata, D. Gomes, M. D'Elia, M. Paris . 2006. Banco Mundial

5. Assessment:

Three assignments:
Assigment 1. Oral presentation: Principles of integrated water resources managment.
Assigment 2. Written comunication with oral presentaion on: Land and water resources use in upstream basins.
Assigment 3.Technical report on analysis of water availability, flow, uses and quality and water managment strategies in basins with multi-use reservoirs. Discussion as final exam.

6. Estimated Workload:	168	Hours
7. Last Update:	20/7/2010	