



## **A public research laboratory in an industrial wastewater treatment plant: challenges and opportunities**

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### **Short description of the lecture (up to 10 sentences):**

The lecture will be divided into three main parts: context, research topics and technologies development and application.

The context will be described for what concerns the state of the art of research and application in the field of wastewater treatment in the Tuscany region. The role of universities, industries and funding institutions will be outlined with reference to the Tuscany tannery district as a case study.

Selected research topics of interest for industrial effluents treatment will be discussed, with specific focus on:

- respirometry and titrimetry as a tool for complex matrixes and biomass kinetics characterization;
- potential and applicability of mathematical modelling to industrial wastewater treatment;
- biological nitrogen removal as a case study to understand the potential and the uncertainty of bioaugmentation strategies in wastewater (actual and future) treatment;
- including bioprocesses based on sulphur cycle in wastewater treatment train.

Three technologies developed on the basis of the knowledge acquired by investigating the above research topics will be presented.

### **Syllabus of the lecture subjects (enlisted):**

1. The context of reference: the Tuscan Tannery Industrial District and the role of the stakeholders;
2. Introduction to respirometry and titrimetry as techniques for wastewater characterization and biomass kinetics estimation



3. The integration of mathematical modelling and respirometric tests to evaluate microbial population kinetic and stoichiometry;
4. Characterization of complex industrial wastewater
5. Nitrifiers as a model microbial population: the role of selective pressure and environmental conditions variability on nitrifiers kinetics;
6. Nitrifiers as model microbial population: evaluating bioagmentation from different perspectives: kinetics, phylogenetic, efficiency, adaptation and evolution;
7. Autotrophic denitrification: not only Anammox;
8. Application case study 1: a continuous online titrimeter dedicated to the measurement of maximum and actual biological ammonia oxidation rate in activated sludge processes and its potential for energy consumption reduction in wastewater treatment;
9. Application case study 2: The integration of physical chemical and biological processes in to an innovative treatment train applied to recalcitrant removal from agro-food industry effluents.
10. The implementation of the moving bed bioreactors concept in gaseous streams treatment through the development of a moving bed biotrickling filter.

<b>Terminy wykładów</b>			
<b>Data</b>	<b>Dzień tyg.</b>	<b>Godzina</b>	<b>Sala</b>
2015-10-05	Pn	16.15-21.00	WETI A sala 06/08
2015-10-06	Wt	16.15-21.00	WETI A sala 06/08
2015-10-07	Śr	16.15-21.00	WETI A sala 06/08