

## International Doctorate in Civil and Environmental Engineering

DOCTORAL COURSE – A.Y. 2021/22

# Bioenergetics of microbial growth

Teacher: **Tommaso Lotti and Cecilia Polizzi**

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Calendar	
Wednesday 28/09/2022, 3 hours - 10:00-13:00	Tommaso Lotti (3 hours)
Wednesday 5/10/2022, 3 hours - 10:00-13:00	Tommaso Lotti (2 hours), Cecilia Polizzi (1 hour)
Wednesday 12/10/2022, 3 hours - 10:00-13:00	Cecilia Polizzi (3 hours)
Total	9 hours – 4,5 credits

Program
<p>In this course we describe a methodology based on bioenergetic analysis of chemotrophic microbial growth systems that allows for a generalized system description. The main parameters can be estimated based on the identification of (i) the Gibbs energy supplying redox reaction and (ii) the carbon and nitrogen source for microbial growth. The calculated parameter values can be considered as a first approximation and allow for comparison with measured parameter values. Stoichiometric and kinetic parameter values that deviate strongly from the estimated values suggest that a highly specific microbial system is encountered. Herewith, the generalized method may serve as a reference framework for interpretation of stoichiometric and kinetic parameter values describing microbial growth processes. Furthermore, the generalized method based on thermodynamics considerations may serve as interpretive tool for the experimental planning and results interpretation in competition-based studies. The course will comprise the presentation of case studies where such a thermodynamics-based method has been applied.</p>