



COURSE: SANITARY-ENVIRONMENTAL ENGINEERING

TEACHER: IGNAZIO M. MANCINI, DONATELLA CANIANI

e-mail: ignazio.mancini@unibas.it;
donatella.caniani@unibas.it

website:

Language: Italian

ECTS: 9

n. of hours: 90

Academic year: 2014/15

Campus: Potenza

Semester: Full year

TOPICS

The course is oriented to the description and understanding of the pollution phenomena and to the study of the processes of depollution, with particular reference to water and wastewater. The course will also provide the basis for the understanding of issues related to the management and treatment of municipal solid waste.

TEACHING METHODS (please tick one or more options)

- Theoretical lessons
- Tutorials in classroom
- Tutorials in laboratory
- Project works
- Technical visits

Other activities (please specify) _____

TEXTBOOKS

METCALF & EDDY, WASTEWATER ENGINEERING: TREATMENT AND REUSE, MCGRAW-HILL, 2003. LECTURE NOTES AND MATERIAL PROVIDED BY THE LECTURER

ON-LINE EDUCATIONAL MATERIAL

web address: The material is loaded into a folder that is shared with the students through a sharing platform (eg. Dropbox)

LEARNING OUTCOMES

Students will acquire notions related to: kinetics of chemical reactions, criteria for the execution of mass balances and for the analysis of ideal and real reactors, parameters of characterization of the environmental compartments (water, air, soil), theoretical foundations related to the principal chemical, physical and biological processes for water and wastewater treatment and for treatment, management and reuse of municipal solid waste.

REQUIREMENTS

None

EVALUATION METHODS (please tick one or more options)

- Intermediate verifications
- Written examination
- Discussion of a project work
- Practical test
- Oral examination

Other methods (please specify) _____

DETAILED CONTENT

Parameters of characterization of water and wastewater: physical, chemical and biological parameters. Water Pollution phenomena. Stoichiometry and kinetics of reactions: reversible and irreversible reactions, homogeneous and heterogeneous reactions; order of reactions. Ideal and real reactors: model of the batch reactor, model of the continuous flow stirred tank reactor (CFSTR); model of the plug flow reactor (PFR); general mass balance equation; analysis of the response of reactors to impulse signals and step signals; comparison between CFSTR and PFR reactors; series of reactors. Introduction to the processes of water treatment: primary, secondary and tertiary treatments; chemical, physical and biological treatments. Theory of gravity separation: theory of settling of isolated particles; theory of solid flux, basics of design of grit chambers and settlers. Biological reactors: kinetic of microorganisms; mass balances of biomass and substrate; reactors with suspended biomass; sequencing batch reactors. Nitrification and denitrification. Mass transfer: absorption and gas-liquid desorption; kinetic of the process;



ion exchange, membrane processes. Filtration: movement of fluids in porous media; filtration in volume. Disinfection: disinfection with chlorine; ozone disinfection. Treatment and disposal of sewage sludge: processes of separation and conversion. Municipal solid waste (MSW): characterization of MSW, MSW integrated management, main technologies for collection, treatment and disposal of MSW.

SEMINARS BY EXTERNAL EXPERTS YES × NO

FURTHER INFORMATION
