



COURSE: Urban waste management and contaminated site remediation

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website:

Language: Italian

ECTS: 9

n. of hours: 81

Academic year: 2014/2015

Campus: Potenza

Semester: I

TOPICS

1) Waste Management

Analysis of the relevant legislation and solid waste classification. Analysis methods of municipal solid waste composition and treatability. Waste management criteria in local areas and definition of integrated systems. Controlled Landfill. Bio-mechanical treatment plants. Waste incineration and energy production.

2) Contaminated Site Remediation.

Analysis of the relevant legislation. Assessment of pollution and environmental investigation techniques. Physical and chemical analysis in environmental matrices. Models and software for the environmental risk definition of contaminated sites. Groundwater remediation. Contaminated soil remediation.

TEACHING METHODS

x Theoretical lessons

x Tutorials in classroom

x Tutorials in laboratory

Project works

x Technical visits

Other activities (please specify) _____

TEXTBOOKS

Piero Sirini, George Tchobanoglous, Rosario Carlo Noto La Diega. Ingegneria dei rifiuti solidi McGraw-Hill Education
Luca Bonomo. Bonifica di siti contaminati - Caratterizzazione e tecnologie di risanamento. McGraw-Hill Education
Notes of teacher

ON-LINE EDUCATIONAL MATERIAL

web address: At the beginning of the course a shared folder with the students is created to exchange didactic materials and data for tutorials.

LEARNING OUTCOMES

The aim is acquire the skills needed to deal with problems planning and management of the main waste management systems and contaminated sites remediation. To know the relevant legislation, the authorization framework and disciplinary aspects of activities related to waste management and remediation. To develop a critical ability to address issues of planning and location plant at significant environmental impact risk.

REQUIREMENTS

None

EVALUATION METHODS

Intermediate verifications

Written examination

Discussion of a project work

Practical test

x Oral examination

Other methods (please specify) _____

DETAILED CONTENT

1) Waste management

1.1) Environmental legislation. D.Lgs 152/2006 (Parte IV Norme in materia di rifiuti e bonifica dei siti inquinati). Solid waste classification: urban, assimilated, special, toxic and dangerous.

1.2) Characterization. Urban solid waste quality. Product analysis, chemical/physical analysis, evaluation the calorific value, biodegradability test and biological stability.



1.3) Solid waste production and forecasting models. Waste management in local areas. Integrated systems management. Criteria for the plant location. Optimization of collection and transportation network.

1.4) Waste disposal.

1.4.1) Landfill disposal. Criteria for identification of areas suitable for the construction of plants. General aspects and structural requirements of the plants. Waste degradation processes in landfills. Biogas management and energy recovery systems. Leachate production and criteria for containment and disposal of leachate. Design aspects and dimensioning of the operational units in landfill.

1.4.2) Bio-mechanical treatment. Pre-treatment selection dry/wet. Composting and bio-stabilization. Aerobic stabilization systems. Anaerobic biostabilisation systems and Energy production from biodegradable fractions. Landfill-reactor concept.

1.4.3) Thermic treatment systems. Thermal balance of combustion. Types of energy waste plants. Thermal cycles and energy recovery. Characterization and control of solid and gaseous effluents. Project criteria and dimensioning of the operational units. Thermic treatments unconventional (pyrolysis, gasification, plasma).

2) Contaminated site remediation.

2.1) Environmental legislation. D.Lgs 152/2006 (Parte IV Norme in materia di rifiuti e bonifica dei siti inquinati). The different typologies of polluted sites and their classification.

2.2) Assessment of pollution. Technical investigations for the characterization of the soil, subsoil, groundwater. Direct investigation techniques and criteria for sampling. Indirect investigation techniques. Elements of analytical techniques for the determination of the main families of pollutants in solid and liquid matrices. Elements of hydrology and dynamics of pollutants. Environmental risk for contaminated sites. Software for risk assessment.

2.3) Groundwater remediation techniques. The groundwater pollutants and their physico-chemical properties. Control parameters of the movement of organic and inorganic pollutants in groundwater. Treatments in situ. Bioremediation techniques. Concept of "hydraulic barrier". Pumping systems and treatment re-entering in the groundwater. Implementation and control of reactive barriers.

2.4) Contaminated soil remediation techniques. The selection criteria of remediation. Techniques di "soil washing", pollutant gas extraction, confinement, stabilization, inertisation, thermal methods, electrochemical methods, biological methods. The reliability of the different systems of economic evaluation.

SEMINARS BY EXTERNAL EXPERTS YES x NO

FURTHER INFORMATION
