Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Technologies for Environmental Protection and Safety			
ACADEMIC YEAR: 2019/2020			
TYPE OF EDUCATIONAL ACTIVITY: Characterizing			
TEACHER: DONATELLA CANIANI			
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Language: Italian			
ECTS: 4 for theoretical lessons, and 2 for classroom tutorials	n. of hours: 36 hours for theoretical lessons, and 18 hours for classroom tutorials	Campus: Potenza School of Engineering Program: Master Degree in Environmental Engineering	Semester: I

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

Learning results

The student must demonstrate to know and understand the problems related to:

• basic elements of environmental legislation;

• pollution of environmental matrices (water, air, soil), chemical-physical and biological properties of pollutants and environmental matrices, possible interactions between contaminants and environmental matrices,

• the main techniques for analyzing and investigating contaminated sites,

• fundamental characteristics of treatment plants and clean-up systems;

• analysis of the risk of exposure to different types of contaminants;

• safety measures.

Knowledge and understanding skills

The student must demonstrate to be able to design complex interventions optimized for specific territorial and environmental contexts. In particular, he must demonstrate the ability to make choices that are adapted to the changing technological context, respecting for the principles of the circular economy.

Autonomy of judgment

The student must be able to know in an autonomous way the effects and implications of a technical, economic and environmental nature, of the design alternatives that characterize the environmental remediation. It must also be able to direct decision-makers and stakeholders towards eco-compatible and innovative solutions with a view to constantly improving system performance and reducing overall environmental impacts.

Communicative Skills

The student will be able to communicate with competence and language skills on the techniques of modeling and analysis of self-purification processes and the phenomena of pollution of natural water bodies.

Learning Skills

The student will be able to develop water quality models using mass balance equations and to apply models of water quality by using commercial and free software.

PRE-REQUIREMENTS

The student must acquire and assimilate the following knowledge:

• basic concepts of "Sanitary and Environmental Engineering"

• Basic knowledge of differential equation resolution

CONTENTS OF THE COURSE

- Introduction to soil and water pollution
- Characterization and classification of environmental matrices and contaminants
- Direct and indirect investigation techniques.
- Reference legislation in the environmental field

- Characterization of contaminated sites: data collection and systematization, conceptual model, survey plan, sampling and analysis of environmental matrices, statistical analysis of environmental data
- Risk analysis: phases, site-specific risk analysis, main software
- Safety measures: classification of interventions in accordance with Legislative Decree 152/2006, classification of technologies, materials used, surface and perimeter remediation techniques, background remediation techniques
- Remediation technologies: introduction and classification, criteria for the selection of possible technological alternatives and for the choice of intervention.

TEACHING METHODS

The course provides 54 hours for theoretical lessons and exercises. Particularly, 36 hours will be theoretical lessons and 18 hours will be classroom tutorials. Seminars by external experts are provided, focusing on the biological nitrogen removal processes and GreenHouse Gas emissions from surface water bodies and wastewater.

EVALUATION METHODS

Oral examination. The exam focuses on the arguments investigated during the theoretical and tutorial lessons. To pass the oral exam the student must acquire at least 18 points out of 30. Experts are expected to intervene in the classroom on specific subjects.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Lecture notes and material provided by the teacher; Slides.

Textbook:

- Bonifica dei siti contaminati, Luca Bonomo, McGraw-Hill.

INTERACTION WITH STUDENTS

- Firstly, the course aims, syllabus, and evaluation methods will be defined. Secondly, the professor's handbook will be provided by means of dropbox folders. Simultaneously, a student list will be done, including first name, last name, student ID, e-mail.
- Professor's office hours: Wednesday from 10.30 a.m. to 12.30 p.m. If there is the need to more explanations about the items argued during the course, further office hours could be defined subsequently, by contacting the professors by email or by phone.

EXAMINATION SESSIONS (FORECAST)[1]

24/09/2019, 17/10/2019, 14/11/2019, 12/12/2019, 16/01/2020, 13/02/2020, 12/03/2020, 16/04/2020, 14/05/2020, 18/06/2020, 23/07/2020.

SEMINARS BY EXTERNAL EXPERTS YES X NO □

FURTHER INFORMATION

[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.