

PhD programme in Earth, Environmental and Resources Sciences

Instructor	Prof. Giacomo Russo, DiSTAR, UNINA
Course Title	Sustainable reuse of excavated soils and rocks
Total Number of Hours	12 hours (3 CFU)
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Course Description

The course provides an overview of the main soil improvement techniques, focusing on both traditional and innovative approaches. The first part examines methods based on the use of conventional binders, such as lime and cement, highlighting their stabilization mechanisms, chemical–physical interactions, and fields of application in geotechnical engineering. The course then explores the use of innovative binders, particularly alkali-activated materials, emphasizing their potential in terms of mechanical performance, durability, and environmental sustainability. Finally, the reuse of conditioned soils from mechanized tunnel excavations is addressed, with the aim of promoting circular economy strategies and reducing the environmental impact of geotechnical works.

Course Contents

1. Improvement techniques based on the use of traditional binders (lime, cement)
2. Improvement techniques based on the use of innovative binders (alkali activated binders)
3. Reuse of conditioned soil from mechanized tunnel excavations

Learning Outcomes

The course is specifically designed to extend participants' understanding of how the concept of reuse can be advanced toward a zero-waste goal within the field of civil construction. In this context, it aims to provide a comprehensive overview of soil improvement techniques as enabling tools for more sustainable design and execution of geotechnical works, fostering informed decision-making in the selection of materials and methods with reduced environmental footprint.

The course aims to develop practical and analytical skills in the design of soil improvement interventions, including the ability to select appropriate binders, interpret laboratory and in situ test results, and evaluate performance in terms of strength, stiffness, and durability.



Participants will also gain awareness of environmental and sustainability aspects related to material selection and reuse practices.

Teaching Format

Lectures, data analysis sessions, and discussion of real case studies.

Essential Bibliography

Selected scientific papers and teaching materials provided during the course

Assessment Method (optional)

Active participation during the course