

University of Calabria

Department of Environmental Engineering

Master's Degree Course in ENVIRONMENTAL AND TERRITORIAL SAFETY ENGINEERING on SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES.

Context

Sustainability is one of the most challenging and rapidly growing areas in both the public and private sectors. With increasing recognition of the impact of a world living beyond its possibility, the commitment to sustainable development to meet the needs of present generations without jeopardising those of the future has never been more apparent. The scope of Master's Degree in *Sustainable Management of Natural Resources* is to meet this challenge. This Master's Degree offers a genuinely interdisciplinary approach to sustainable resource management. It affords students the opportunity to acquire research skills, to develop theoretical understanding of key issues, and also, importantly aspects of the practical and professional skills required by employers.

Learning objectives and outcomes

The Master's Degree in Sustainable Management of Natural Resources is characterized by a strong interdisciplinary nature of its training path, configured to train a professionally complex figure who should intervene in multiple occupational areas of the sustainability.

The new Master's Degree in Sustainable Management of Natural Resources aims to train master's graduates with the ability to conceive, plan, design and manage works, systems, plants and services in the various areas of interest of the environmental engineering:

1. sustainable management of water resources, quality monitoring and pollution prevention of environmental matrices (air, water, soil), the treatment of emissions in solid, liquid and aeriform form and the remediation of polluted sites;
2. the use and management of natural resources, raw materials, by-products and energy resources, with particular regard to those deriving from renewable sources, and the treatment, recovery and disposal of civil and industrial waste;
3. the management of the land and the built environment, the improvement of the functional, energy and environmental performance of structures and infrastructures, and the assessments of the environmental impact of civil and industrial activities.

The specific skills which will be acquired by the end of the course include:

- a thorough knowledge of the theoretical-scientific aspects of engineering, mathematics and other basic sciences and be able to use this knowledge to identify, formulate and solve engineering problems for the environment and the territory, characterized by high complexity, according to a systemic vision and an integrated and interdisciplinary approach;
- the acquisition of the principles and tools for the design of engineering works, systems, plants and services of interest to the environment;
- the acquisition of the adequate awareness of the need for active protection of the natural environment, sustainable management of natural resources and reduction of the ecological footprint according to the principles of the circular economy;
- the ability to understand the complex interactions between anthropogenic activities and natural systems, recognizing the value of resources and ecosystem services, to ensure the protection of the environment through the minimization of elements of fragility and the optimization of resilience to changes climate, hydro-geological instability, seismic events and, more generally, extreme events;
- the ability to use information and telecommunications technologies in the representation of the territory and in the acquisition, management and interpretation of data obtained from remote sensing and distributed monitoring networks;

- the ability to consciously design, implement and use physical, mathematical and numerical models for the simulation of environmental phenomena and processes, knowing how to critically interpret the results;
- the knowledge of the problems of safety and health protection in natural and anthropic, civil and industrial environments.

Main topics

This innovative Master's Degree programme is open to applicants from all disciplinary backgrounds and promotes leadership and embraces action-based, experiential learning, facilitated through a series of lectures, work placements and group projects. The programme fosters critical thinking and promotes the use of initiative for problem-solving and decision-making in sustainable development.

Employability and careers

Graduates in the Master's Degree in Sustainable Management of Natural Resources will be able to find employment opportunities in the national and international work market in professional firms, consulting and design firms, construction companies, management and maintenance of civil works, infrastructures and plants, manufacturing or service companies, public and private entities, managers and concessionaires of works, networks and services, operating:

- in the planning, design, construction and management of works, systems, plants and services for the protection of water bodies, remediation of natural and anthropogenic systems, remediation of contaminated environmental matrices, treatment of primary and waste water and emissions into the atmosphere, management of water resources, raw materials, by-products and energy resources, the management of the waste cycle;
- in the planning, design, construction and management of environmental monitoring systems, infrastructures, systems and service networks;
- in the assessment of the environmental impacts and compatibility of civil and industrial works and interventions, in the strategic environmental assessment of territorial plans and programs, in the safety of work and construction sites and in the protection of workers' health;
- in the research, development and production of innovative technological solutions for the environment.

Master's graduates in the class will also be able to find employment:

- at universities and research institutions, in the field of higher education and research;
- in companies operating on the market through quantitative analyses of the value of the environment and its ecosystem services.

Keywords (up to 6 terms)

Sustainability, Management of Natural Resources, Circular Economy, Environmental Impacts, Renewable Energies, Raw Materials.

Claims (for advertising)

“We’ll deliver to the new generations of Environmental Engineers a New Deal for the next generations”

Duration: 2 years

Start date: October 1, 2021.

Total amount of hours (number of ECTS credits): 3000 hours (120 ECTS credits)

Admission requirements

Master's Degree in: Environmental Engineering, Civil Engineering, Earth Science, Environmental Science and/or equivalent.

Bachelor's Degree in: Environmental Engineering, Civil Engineering, Earth Science, Environmental Science and/or equivalent.

Language skills in English: B1 and/or higher levels.

How to apply:

Tuition:

Scholarships:

Table with 2021/2022 Course Catalogue (include 1st year and 2nd year courses with ECTS credits)

1 st year				
Course	Area	Short description	ECTS	Semester
Design of Structures in Seismic Areas	Structural Engineering	The course provides the basic tools for the design and safety verification of structures in seismic areas with reference to the Eurocodes. The main skills that will be acquired include the ability to design/verify, in terms of ductility, strength and stiffness, an anti-seismic reinforced concrete structure.	9	1
Electrical Systems for Sustainable Development	Electrical Power Systems	Electrical Systems course aims to give at the students the basic knowledge of electrical engineering and addresses the issues associated with electric machine and electric systems for energy.	6	1
Climate Change Scenarios	Hydraulic and Marine Constructions and Hydrology	The course deals with the main natural and anthropogenic aspects, direct and indirect, related to climate change for different scales of interest. The aim of the course is to provide the necessary tools to understand and model the interconnections between climate, hydrological extremes, energy balance and carbon cycle and determine their global effects.	6	1
Subsurface Flow and Contaminants Transport	Hydraulics	The course is dedicated to the study of groundwater flow and transport of contaminants in real porous media. The aim of the course is to deliver the tools for the groundwater flow and solute transport simulation in order to	6	1

		know the fate of the contaminants and how to remediate polluted sites.		
Hydraulic Constructions for Sustainable Development	Hydraulic and Marine Constructions and Hydrology	The course deals with the studies on the protection of water resources, the design of the classic hydraulic engineering structures, the mechanisms that control the water flow in the earthly phase of the hydrological cycle, with important opportunities for the application in the protection of the land from flooding.	9	2
Energy from Renewable Sources	Building Physics and Building Energy Systems	The course provides the necessary knowledge to design systems that use renewable energy sources by considering technical, economic, and environmental aspects. For each energy source, the course deals with the design of the main plant components, the criteria for evaluating the energy produced, and the methodologies for assessing their environmental impact.	9	2
Operating Tools for Hydraulic and Environmental Studies	Hydraulic and Marine Constructions and Hydrology	The course deals with the numerical models able to model and solve hydraulic and environmental problems. The course addresses univariate and multivariate modeling of problems formulated both in a deterministic and in a stochastic approach.	9	2
English for Engineering		B2 level	3	2
2nd year				
Course	Area	Short description	ECTS	Semester
Territorial Planning and Urban Renewal	Urban and Regional Planning	The course aims to provide students with the cultural foundations and critical tools to be able to read the territorial context in its complexity. The course provides students with a critical knowledge capacity useful for a project of the territory that is capable of mitigate the environmental issues.	6	1
Renewable Sources and Energy Enhancement Processes	Chemical Technologies	The focus of the lectures is on the sector of energy production from renewable sources. The class is divided into two parts. The first one deals with issues relating to traditional and renewable primary	9	1

		energy sources together with the analysis of climate change and greenhouse gas emissions. In the second part, processes of energy production from renewable sources are analyzed.		
Membrane Processes for Environment Sustainability	Chemical Foundations of Technologies	This course provides the basics knowledge and understanding of the chemical fundamentals of membrane technology. The aim of the course is to to acquire specific skills and expertise on the most common applications of membrane science and technology: desalination, wastewater treatment, gas separation, bioreactors in pharmaceutical applications, and fuel cells.	6	1
Sustainable Water Management	Hydraulic and Marine Constructions and Hydrology	The course addresses the issue of water resource management in the context of the principles and models of sustainability and optimization. It deals with the study of the Integrated Water System both from a hydraulic, technical, construction and technological point of view, and from an economic and management point of view.	6	2
Sustainable Materials for Environment and Constructions	Materials Science and Technology	The course deals with the transition from traditional towards sustainable materials. The main features for eco-friendly productions, disposal or recycle, of sustainable materials for the environment and the buildings are presented.	6	2
Elective Courses			12	1-2
Final Thesis			18	