

# *Formation in Soil and Water Bioengineering Workshop*

EVORA · 9th March 2018

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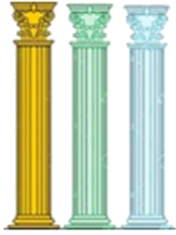


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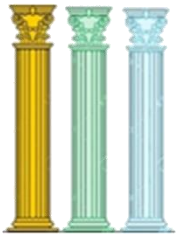


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# The Soil and Water Bioengineering Formation in the Mediterranean Area

## JOÃO PAULO FERNANDES - University of Évora





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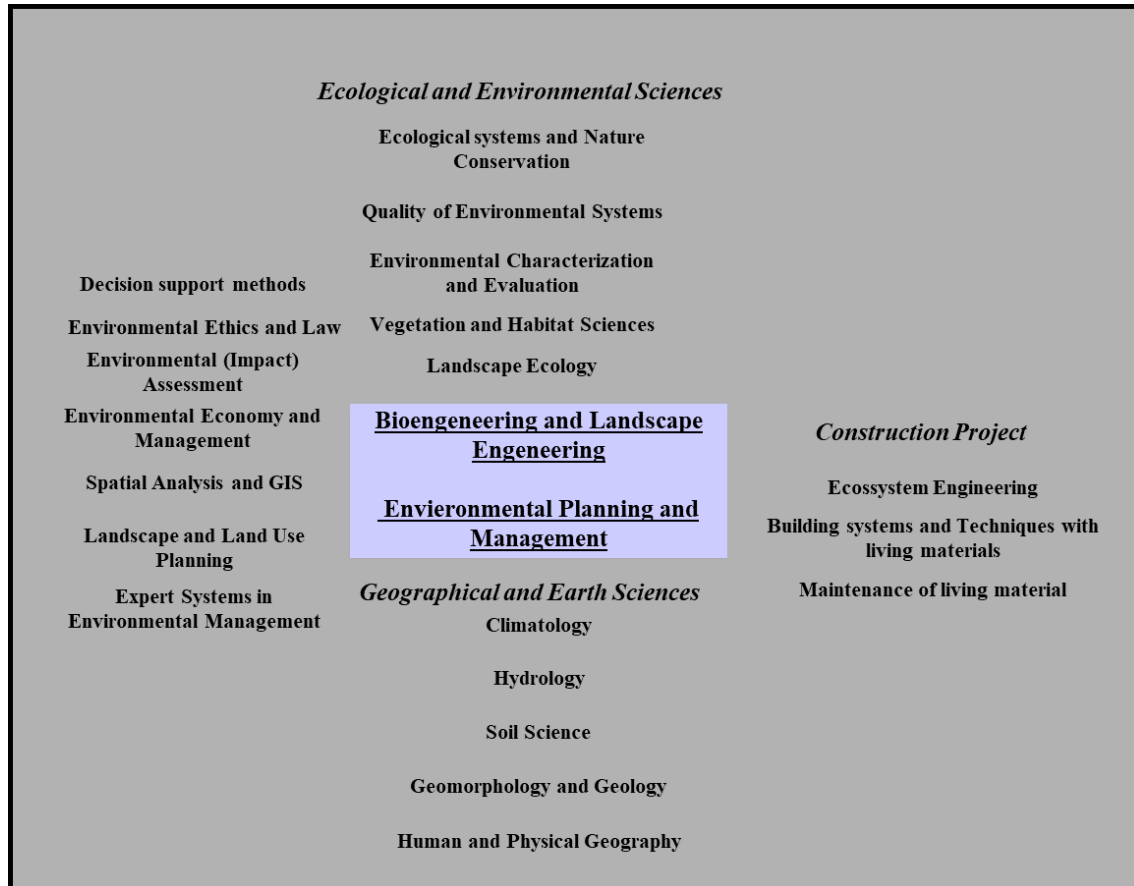
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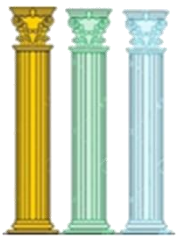


# Existing or extinguished models

## 1 – 5 years university course with dissertation (University of Évora, Portugal, 1981-2008)

General concept

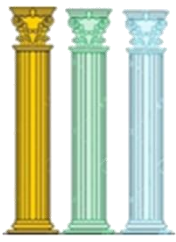




## **BASIC FORMATION**

- **Basic Sciences:**
  - Mathematics, Chemistry, Physics, Statistics, Operational Research.
- **Environmental and Landscape Knowledge:**
  - Nature Sciences: Geology, Climatic Aspects, Soils, Geomorphology, Biology, Botanic, Fauna;
  - Engineering Sciences: Drawing and Design, Topography, Hydrology, Hydraulics, Information Geographic Technologies.
- **Landscape Characterization and Management :**
  - Ecological Sciences;
  - Sociology and Economy;
  - Ecological Characterization: Phytosociology, Characterization and Evaluation of Vegetation; Phytocoenology;
  - Characterization and Environmental and Landscape Evaluation, Spatial Analysis;
  - Environmental and Landscape Management, Environmental Evaluation, Environmental Quality, Environmental Impact Assessment, Ethics and Environmental Legislation;
  - Bioengineering project and design.

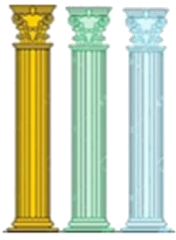




## Specialization

- **Planning and Management of Systems of Use:**
  - Cost-Benefit Analysis
  - Ecology and Cynegetic Planning and Management
  - Expert Systems in Natural Resources Management
  - Multicriteria Analysis and Landscape Planning and Management
  - Systems of Landscape Use
  
- **Planning and Management of Natural Systems:**
  - Expert Systems in Natural Resources Management
  - Multicriteria Analysis and Landscape Planning and Management
  - Spatial Analysis and Geographic Modelling
  - Phytocoenology
  - Physical geography of Portugal
  
- **Bioengineering Project:**
  - Hydraulics and Fluvial Correction
  - Mechanics and Soils Stabilization
  - Materials and Constructive Techniques with Non-living Material
  - Materials and Constructive Techniques with Live Material
  - Constructive systems in Bioengineering
  
- **Dissertation**





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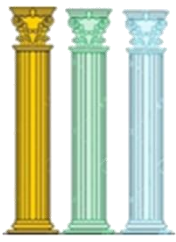
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In reality it was essentially and Landscape Management course with a heavy weight on Phytosociological formation and incorporating a component of Bioengineering project

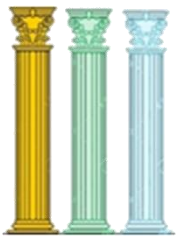




# 2 – Master Course (University of Palermo, Italy,

Teachings first year	credits	Term	Val.	Area	Scientific sector
<a href="#">01846 - ENVIRONMENTAL CHEMISTRY</a> <i>MACCOTTA (RU)</i>	6.0	1	V	B	CHIM/12
<a href="#">02679 - ECOLOGY - INTEGRATED COURSE</a> <i>LO VERDE (RU)</i>	12.0	1	V		
<a href="#">APPLIED ECOLOGY</a> <i>TOMASELLO (PA)</i>	6.0			B	BIO/07
<a href="#">FAUNAL BIOINDICATORS</a> <i>LO VERDE (RU)</i>	6.0			B	BIO/05
<a href="#">15406 - REMOTE SURVEY AND TERRITORIAL INFORMATION SYSTEMS</a> <i>DI STEFANO (PA)</i>	6.0	1	V	B	AGR/10
<a href="#">15407 - HYDRAULICS AND HYDROLOGY</a> <i>FERRO (PO)</i>	6.0	1	V	B	AGR/08
<a href="#">86626 - ENGLISH(*)</a>	3.0	1	G	F	
<a href="#">11545 - GEOBOTANY AND BIOTECHNICS OF VEGETAL SPECIES - INTEGRATED COURSE</a> <i>GIANGUZZI (PA)</i>	11.0	2	V		
<a href="#">BIOTECHNICS OF VEGETAL SPECIES</a> <i>SCHICCHI (PO)</i>	6.0			B	BIO/02
<a href="#">GEOBOTANY</a> <i>GIANGUZZI (PA)</i>	5.0			C	BIO/03
<a href="#">15408 - ENVIRONMENTAL GEOLOGY AND GEOMORPHOLOGY</a> <i>CONOSCENTI (PA)</i>	6.0	2	V	B	GEO/04
<a href="#">Free subjects</a>	9.0			D	

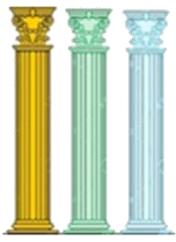




Teachings second year	credits	Term	Area	Scientific sector
<a href="#">05917 - FINAL EXAMINATION</a>	20.0	1	G E	
<a href="#">07553 - PROFESSIONAL PRACTICE</a>	5.0	1	G F	
<a href="#">11561 - NATURALISTIC ENGINEERING TECHNIQUES</a> D'ASARO (PO)	6.0	1	V B	AGR/08
<a href="#">15409 - AGRO-FOREST TECHNIQUES FOR SOIL PROTECTION - INTEGRATED COURSE</a> DI MICELI (RU)	9.0	1	V	
<a href="#">APPLIED SYLVICULTURE</a> LA MELA VECA (RU)	3.0		C	AGR/05
<a href="#">AGRO-TECHNIQUE FOR SOIL PROTECTION</a> DI MICELI (RU)	6.0		C	AGR/02
<a href="#">15412 - PAEDOLOGY AND SOIL CONSERVATION - INTEGRATED COURSE</a> DAZZI (PO)	9.0	1	V	
<a href="#">PAEDOLOGY AND SOIL ASSESSMENT</a> DAZZI (PO)	3.0		C	AGR/14
<a href="#">SOIL EROSION AND CONSERVATION</a> BAGARELLO (PO)	6.0		B	AGR/08
<a href="#">15414 - LANDSCAPE ARCHITECTURE AND PLANNING</a>	6.0	2	V B	ICAR/15
<a href="#">15415 - ENVIRONMENTAL EVALUATION TECHNIQUES</a> DI FRANCO (PA)	6.0	2	V B	AGR/01







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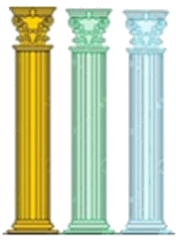
## Other models within University Degrees

In Italy – at least in 6 Universities

In Portugal – at least in 2 Universities

General or specialised subjects, modules or  
parts of modules

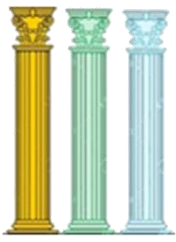




e.g. independent module:

- CRITERIA AND METHODS FOR THE CONTROL OF THE HYDROGEOLOGICAL RISK
- MODEL FOR THE CALCULATION OF THE FLOOD RISK
- MODEL FOR THE CALCULATION OF THE FLOOD INTENSITY
- MODELS OF ROOT REINFORCEMENT AND SLOPE STABILITY
- DEFINITION, TARGETS, FUNCTIONS AND DOMAIN OF BIOENGINEERING
- BASIC METHODS OF PROJECT AND DESIGN OF:
  - SLOPE STABILIZATION (EROSION AND SLOPE STABILITY)
  - CORRECTION OF WATERCOURSES
  - MORPHOLOGICAL RECONSTRUCTION





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## Technical courses

# Formation cours for managers and technical responsables in Bioengineering

### Course A

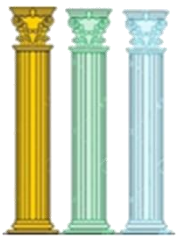
Formation course for managers in Bioengineering

- Forest operators from Piemonte region with high specialization in Bioengineering;
- Operators depending from the former (forestry enterprises, sub contractors, producer associations, etc.) from Piemonte with high specialization in Bioengineering.

### Course B

Bioengineering course for technical responsables

- Director of works of the Piemonte region that operate in the field of Bioengineering;
- Technical professionals from Piemonte that operate in the field of Bioengineering;
- Technical functionaries from the Piemonte administration that operate in the field of Bioengineering.



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# Technical courses with official professional recognition

## Course A

Six weeks organised in: 80 hours of theory, 160 hours of construction site practice, 3 days of practical project

### Theory

- Aim of Bioengineering.
- Type of disturbances and their dimensional parameters.
- Domain of application of Bioengineering interventions.
- Norms and rules for systematization interventions in slopes, torrents and watercourses as well as safety in the construction site.
- Typologies of intervention (description and technical and design aspects).
- Equipment and machinery in the construction site: earth movements and works with rocks.
- Learning techniques.
- Interpretation of a project.

### Practice

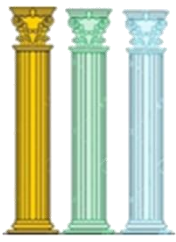
- Organization and logistics of the construction site.
- Technics of bioengineering interventions (structural slope reconstruction, streambank stabilization and defence, hydraulic management, revegetation and forestry management).
- Gathering, conservation and use of living material.
- Construction site equipment and machinery.
- Safety and ergonomomy in the construction site.
- Learning techniques.
- maintenance of constructions and interventions.
- Learning training.

## Course B

48 Hours - distributed in 6 non consecutive days

- Theoretical activity (methodological formation and project)
- Practical activity focused in the projected interventions

The projects and practical work involve the most common and significant intervention typologies in the region (e.g. double cribwall, live slope grid, living bush mattress or wooden sill).



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# Informal courses

## Specific formation in Bioengineering

A 100 hours formation plan organised in four courses was designed:

Course 1: Introduction to Bioengineering techniques, materials and Bioengineering applied Botanic 25 hours

Course 2: Bioengineering in slope stabilization 25 hours

Course 3: Bioengineering in streambank stabilization 25 hours

Course 4: Project and construction 25 hours building a small intervention

## Courses **with other formats:**

Theoretical and practical course on fluvial Bioengineering 20 hours, 8 hours theory and de 12 hours practical exercise

Course on fluvial Restauration and Bioengineering: 60 hours

Course on planning and calculation in Bioengineering interventions: 16 hours Formation in Restauration

Course on Green Infrastructure: 15 Hours

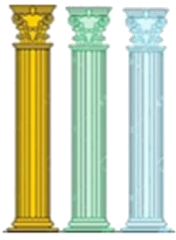
Course on Hydrologic forestry restauration

Course on Mine, quarry and landfill restauration

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Asociación Española de Ingeniería del Paisaje





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Thank you for your attention!

