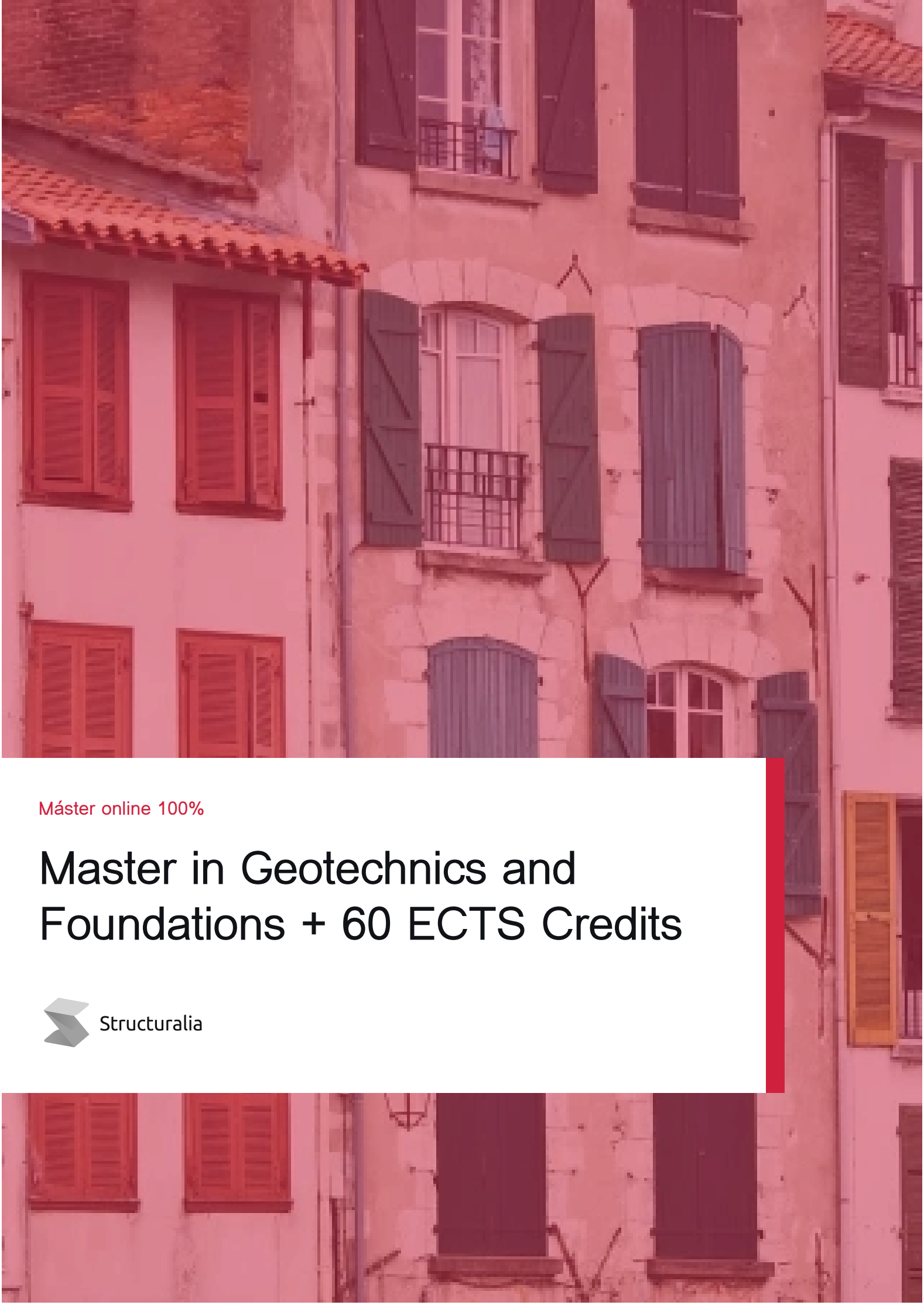


Máster online 100%

Master in Geotechnics and Foundations + 60 ECTS Credits

Structuralia

Máster online 100%

Master in Geotechnics and Foundations + 60 ECTS Credits

Modality
Online

Languages
Español

Duration
1500 hours (60 ECTS)

No Limit
AI Assistant

Educational Institutions

Structuralia Engineering eLearning

UCAM Universidad Católica de Murcia

Summary

The Structuralia Master in Geotechnics is a program that seeks to reinforce, increase and strengthen the knowledge and skills of professionals in the construction, geology and civil engineering sectors in Geotechnical Engineering.

Agenda

MODULE 1. INTRODUCTION TO GEOTECHNICS. SOIL AND ROCKS

1. DIDACTIC UNIT 1. SOIL DESCRIPTION

1. The ground. Concept and Training
2. The ground. Types of soils and sedimentary deposits
3. Granular soils. Gravel and sand
4. Cohesive soils. Silts and clays
5. Cohesive soils. Structure, types and properties of clays

2. DIDACTIC UNIT 2. SOIL PROPERTIES AND CLASSIFICATION

1. Elemental properties. Volumes and Weights
2. Elemental properties. granular soils
3. Elemental properties. Cohesive soils
4. Soil classification. Unified Soil Classification System - ASTM)
5. Soil classification. AASHTO System

3. DIDACTIC UNIT 3. DESCRIPTION OF THE ROCKS

1. The Geological Cycle. Plate tectonics and deformations of the Earth's crust
2. Igneous Rocks
3. sedimentary rocks
4. metamorphic rocks
5. Rock, rock matrix and rock mass

4. DIDACTIC UNIT 4. PROPERTIES AND CLASSIFICATION OF ROCKS

1. Properties of the rock matrix
2. Properties of the rock mass. The discontinuities
3. Geomechanical Classifications. Bieniawski's RMR
4. Geomechanical Classifications. Barton's Q index
5. The GSI Index: Geological Strength Index

MODULE 2. WATER IN THE GROUND. EFFECTS ON SOILS AND ROCKS

1. DIDACTIC UNIT 1. FLOW IN POROUS MEDIA

1. The water on the ground. Types of aquifers
2. Darcy's Law. Hydraulic head and hydraulic gradient. Permeability
3. Mechanics and theory of flow in porous media
4. Flow networks
5. Fragment method

2. DIDACTIC UNIT 2. EFFECTIVE STRESS AND INTERSTITIAL PRESSURE. EFFECTS OF WATER ON SOIL AND ROCKS

1. Principle of effective stresses. Application to soil and rocks
2. Distribution of stresses in the ground

3. Siphoning, bottom lifting, internal erosion and tubing
4. Filters. Concept, use and preliminary design
5. Effects of water on the rock matrix and rock mass

3. DIDACTIC UNIT 3. SOIL CONSOLIDATION

1. Introduction
2. The magnitude of the consolidation entry
3. The evolution of the consolidation entry
4. Parabolic isochron theory
5. Preload and radial and mixed consolidation

4. DIDACTIC UNIT 4. WELLS AND PUMPING SYSTEMS

1. Conception and construction of wells
2. Well design. Analytical solutions for individual wells
3. Design of groups of wells. Analytical solutions for groups of wells
4. Conception and construction of wellpoints
5. wellpoints design

MODULE 3. CHARACTERIZATION AND GEOTECHNICAL RECOGNITION OF THE TERRAIN AND INSTRUMENTATION AND AUSCULTATION

1. DIDACTIC UNIT 1. FIELD RECOGNITIONS

1. Previous office work
2. Design and planning of research campaigns
3. Field reconnaissance and preliminary investigations
4. Drilling and sampling techniques
5. In situ tests for soils and rock masses

2. DIDACTIC UNIT 2. LABORATORY TESTS IN THE GEOTECHNICAL FIELD (I)

1. Identification and status tests (I)
2. Identification and status tests (II)
3. Resistance tests (I)
4. Resistance tests (II)
5. Interpretation of the triaxial test

3. DIDACTIC UNIT 3. LABORATORY TESTS IN THE GEOTECHNICAL FIELD (II)

1. Deformability test
2. Interpretation of the oedometric test
3. Compaction and reuse tests
4. Rock tests (I)
5. Rock tests (II)

4. DIDACTIC UNIT 4. AUSCULTATION

1. Introduction to auscultation
2. Instrumentation equipment (I)
3. Instrumentation equipment (II)
4. Instrumentation equipment (III)
5. Examples of application to works

MODULE 4. MECHANICS OF THE CONTINUOUS MEDIUM AND CONSTITUTIVE MODELS. APPLICATION TO SOILS AND ROCKS

1. DIDACTIC UNIT 1. MECHANICS OF CONTINUOUS MEDIA AND ELASTICITY

1. The stress tensor: total, effective and interstitial. Mohr's circle in tensions
2. The strain tensor. Mohr's circle in deformations
3. Problem statement
4. Equations and parameters of Elasticity
5. Main elastic solutions in soil and rock mechanics

2. DIDACTIC UNIT 2. THEORY OF PLASTICITY

1. Introduction to Plasticity
2. The plasticization criterion. Types of plastic behavior
3. Law of plastic behavior. Plastic creep and plastic potential
4. Main theorems and postulates of the Theory of Plasticity
5. The elastoplastic Mohr-Coulomb model

3. DIDACTIC UNIT 3. CONSTITUTIVE MODELS FOR SOILS

1. Rheological models
2. Hardening Soil Model
3. Hardening Soil Small Model
4. Jardine Model
5. Cam Clay Model

4. DIDACTIC UNIT 4. CONSTITUTIVE MODELS FOR ROCKS

1. Hoek and Brown constitutive model
2. Constitutive model for Barton - Choubey joints and discontinuities
3. Viscosity, viscoelasticity and viscoplasticity
4. Extension of rheological models
5. Viscoelastic and viscoelastic constitutive models

MODULE 5. GROUND PUSHES AND EARTH CONTAINMENT STRUCTURES

1. DIDACTIC UNIT 1. SOIL MECHANICS

1. Previous works
2. Design and planning of research campaigns
3. The geotechnical study
4. Soil samples
5. Preliminary investigations and field surveys
6. Drilling and sampling techniques
7. In situ tests for soils and rock masses

2. DIDACTIC UNIT 2. MAIN FIELD TESTS

1. Concept of identification and state of resistance
2. Identification and status tests
3. Resistance tests
4. Introduction to triaxial testing. Previous concepts

5. Definition of the triaxial test
6. Interpretation of the triaxial test
7. Practical applications of triaxial testing

3. DIDACTIC UNIT 3. SOIL AND ROCK TESTS

1. Deformability test
2. Interpretation of the oedometric test
3. Compaction and reuse tests
4. Laboratory tests for rock characterization
5. In situ tests for rock characterization

4. DIDACTIC UNIT 4. DEFINITION OF SERVICE LIMIT STATES

1. Definitions and concepts
2. Stress distributions in the soil
3. Settlement estimation in granular soils
4. Settlement estimation in cohesive soils
5. Other methods and other deformations

5. DIDACTIC UNIT 5. THEORETICAL FOUNDATIONS OF EARTH THRESSES

1. Fundamental Coulomb Hypotheses
2. Soil mechanics according to Terzaghi and Rankine
3. Thrust coefficients at rest. Empirical relations of Jaky and Mayne
4. Winkler module
5. Numerical models (2D/3D FEM, LEM, DEM)
6. The earthquake and its mechanical influences on the ground

6. DIDACTIC UNIT 6. RIGID WALLS (NON-MOVABLE)

1. Introduction to rigid wall design
2. Design and calculation of gravity walls
3. Gravity Wall Geometry and Construction Procedures
4. Classification and stability of rigid walls
5. Masonry systems
6. Other rigid walls

7. DIDACTIC UNIT 7. FLEXIBLE WALLS (MOVABLE)

1. Principles of flexible behavior
2. Design and specifications of gabion and sieve walls
3. Continuous Reinforced Concrete Screens
4. Pile and micropile screens
5. Types of anchors on screens
6. Excavations in sheet piles and trenches

8. DIDACTIC UNIT 8. GENERAL DESIGN AND CONSTRUCTION CONSIDERATIONS

1. Wall construction procedures
2. Auscultation instrumentation for ground movements and monitoring
3. Main land problems (expansive, collapsible, liquefiable soils, anthropic fills, improvement treatments)

4. Selection of type sections and filtration design

MODULE 6. SLOPE ANALYSIS AND STABILITY

1. DIDACTIC UNIT 1. GEOTECHNICAL SOILS

1. Origin of soils
2. Soil types
3. Soil properties
4. Volumetric ratios
5. Sizes and granulometry
6. Soil humidity
7. Atterberg limits
8. Geotechnical soil classifications: unified system, AASHTO classification

2. DIDACTIC UNIT 2. SOIL CLASSIFICATION

1. Introduction to soil classification
2. USDA Soil Classification System-Soil Taxonomy
3. Superficial diagnostic horizons (epipedions)
4. Subsurface diagnostic horizons

3. DIDACTIC UNIT 3. ROCK MECHANICS

1. Properties of rocks and rock masses
2. Rock mass classifications: Terzaghi, Deere's RGD, Bieniawski's CSIR, Barton's NGI, Hoek's GSI
3. Geological model
4. Geomechanical model
5. Flat, wedge and overturning of rock blocks

4. DIDACTIC UNIT 4. ROCK-FORMING PROCESSES

1. Magma and magmatic differentiation
2. Classification of magmatic rocks
3. Pegmatitic, hydrothermal and metasomatic processes
4. General concepts and types of metamorphism
5. Classification of metamorphic rocks
6. Mineralogy of metamorphic rocks
7. External agents and processes
8. Sedimentary environments
9. Classification of sedimentary rocks
10. Economic importance of sedimentary rocks

5. DIDACTIC UNIT 5. STABILITY OF HYDRAULIC SYSTEMS

1. Water collection systems
2. Design of individual wells. Analytical solutions
3. Well group design
4. Conception and construction of wellpoints
5. Well points design

6. DIDACTIC UNIT 6. PRINCIPLES AND BASES OF SLOPE STABILITY ANALYSIS

1. Basic concepts of slope stability

2. Stability analysis methods
3. Geotechnical parameters in stability analysis
4. Slope stability in soils and rocks

7. DIDACTIC UNIT 7. METHODS FOR EVALUATION OF STABILITY IN SOIL SLOPES

1. Introduction to slope stability
2. Analysis of slope stability
3. Flat break and circular break
4. Slice method and Taylor abacus

8. DIDACTIC UNIT 8. STRUCTURAL AND KINEMATIC ANALYSIS OF ROCK SLOPES

1. stereographic projection
2. Kinematic analysis of failure of a rock slope due to plane sliding
3. Kinematic analysis of failure of a rock slope by wedge
4. Kinematic analysis of failure of a rock slope due to overturning
5. Kinematic analysis of slope failure of a rock mass

9. DIDACTIC UNIT 9. DESIGN, CALCULATION AND STABILIZATION OF SLOPES AND TUNNELS IN ROCK

1. Safety factor of a rock slope due to plane sliding failure
2. Safety factor of a rock slope due to breakage by wedges
3. Safety factor of a rock slope due to overturning failure
4. Stabilizing and support measures for rock slopes
5. Finite element calculation of rock slopes

MODULE 7. SURFACE FOUNDATIONS

1. DIDACTIC UNIT 1. FLUID DYNAMICS IN POROUS MATERIALS

1. The fundamental states of water
2. Darcy's Law. Soil permeability analysis
3. Definition of phreatic and capillary water
4. Introduction to total, effective and neutral pressures
5. Definition of hydraulic gradient
6. Liquefaction as an effect of overpressures
7. Analysis of the types of aquifers and catchment hydraulics
8. Development of the general flow equation
9. Groundwater

2. DIDACTIC UNIT 2. STUDY OF EFFECTIVE STRESS AND INTERSTITIAL PRESSURE

1. Analysis of the stress state in geotechnical media
2. Graphic representation of the state of stress: Mohr's circle and Mohr-Coulomb criterion
3. Characterization of mechanical behavior through shear and triaxial tests
4. Soil instability associated with groundwater flow
5. Design and application of filters for flow control in the field
6. Interaction of water with the matrix and the rock mass
7. Underground flow behavior

3. DIDACTIC UNIT 3. PRINCIPLES OF SOIL MECHANICS

1. Introduction to soil consolidation
2. Soil properties
3. Soil resistance: basic concepts
4. Loads and actions on the ground
5. The magnitude of the consolidation entry
6. The evolution of the consolidation entry
7. Theory of parabolic isochrones
8. Preload and radial and mixed consolidation
9. Identification and status tests
10. Resistance tests

4. DIDACTIC UNIT 4. STABILITY

1. Water collection systems
2. Design of individual wells. Analytical solutions
3. Well group design
4. Conception and construction of wellpoints
5. Well points design

5. DIDACTIC UNIT 5. MATERIALS AND LOADING HYPOTHESES

1. Introduction to materials
2. Stress calculation
3. Loading hypothesis

6. DIDACTIC UNIT 6. INTRODUCTION TO SURFACE FOUNDATIONS

1. Introduction to shallow foundations
2. Classification and calculation methods
3. Water in the foundations
4. Sinking: safety, load and allowable pressure
5. Safety against sliding, overturning and overall stability
6. The geotechnical study
7. Soil samples

7. DIDACTIC UNIT 7. TYPES AND COMPONENTS OF SURFACE FOUNDATIONS

1. Insulated shoes. Definition
2. Combined shoes. Definition
3. Foundation slabs. Definition

8. DIDACTIC UNIT 8. CALCULATION AND DESIGN OF SURFACE FOUNDATIONS

1. Stress distributions under rigid footings
2. Sinking and bearing capacity
3. Correction factors of the general formula
4. Some particular cases of bearing capacity
5. Sinking pressure from in situ tests
6. Considerations in particular soils
7. Bearing capacity in Rock
8. Definitions and concepts of Service Limit States
9. Stress distributions in the soil
10. Settlement estimation in granular soils

11. Settlement estimation in cohesive soils
12. Other methods and other deformations

9. DIDACTIC UNIT 9. CONSTRUCTION ASPECTS AND QUALITY IN SURFACE FOUNDATIONS

1. Construction processes of shallow foundations
2. Quality control of materials and execution

10. DIDACTIC UNIT 10. SLABS, WELLS, DYNAMIC ASPECTS AND OFFSHORE SCOPE

1. Slabs
2. Semi-deep foundations or foundation pits
3. Dynamic aspects
4. Surface foundations in the maritime and offshore fields

MODULE 8. DEEP FOUNDATIONS. PILES

1. DIDACTIC UNIT 1. BASIC CONCEPTS AND COLUMN PILES IN SOILS

1. Typology of deep foundations
2. Definitions
3. Design bases for deep foundations
4. Basic formulation
5. Calculation of ground resistance against vertical actions in soils
6. Tip resistance in granular soils.
7. Analytical solutions Tip resistance in cohesive soils
8. Analytical solutions Tip resistance in soils through in situ tests

2. DIDACTIC UNIT 2. FLOATING PILES IN SOIL, PILES IN ROCK AND GROUPS OF PILES

1. Shaft resistance in granular soils
2. Analytical solutions Shaft resistance in cohesive soils
3. Analytical solutions Stem resistance in soils through in situ tests
4. Ground resistance against vertical actions in rocks Resistance of a group of piles

3. DIDACTIC UNIT 3. WORKLOADS AND SEATING ON PILES

1. Safety against sinking
2. Safety coefficient
3. Structural stop on piles Seats on piles
4. Pile pullout resistance Formulas for pile driving

4. DIDACTIC UNIT 4. CHOICE OF PILES AND UNCOMMON SITUATIONS

1. Piles subjected to lateral loads Negative friction in piles
2. Load tests on piles
3. Selecting the type of pile
4. Geotechnical calculation of micropiles

MODULE 9. NUMERICAL MODELING IN THE FIELD OF GEOTECHNICS. APPLICATIONS WITH PLAXIS 2D

1. DIDACTIC UNIT 1. NUMERICAL MODELING AND ITS APPLICATION IN GEOTECHNICS. INTRODUCTION TO PLAXIS 2D.

1. Introduction to numerical modeling.
2. The finite element method.
3. Numerical modeling in geotechnics.
4. Introduction to Plaxis 2D. Generalities.
5. Organization and structure of Plaxis 2D. The user interface.

2. DIDACTIC UNIT 2. APPLICATIONS WITH 2D PLAXIS - CONSTRUCTION OF THE GEOMETRY AND THE FINITE ELEMENT MESH.

1. Definition of the geometry and structure of the terrain.
2. Geometric elements, loads and displacements imposed in Plaxis 2D.
3. Definition of the behavior of the terrain. Constitutive models.
4. Structural elements in Plaxis 2D.
5. Definition of the finite element mesh.

3. DIDACTIC UNIT 3. APPLICATIONS WITH PLAXIS 2D - CALCULATION, WATER AND ANALYSIS OF RESULTS.

1. Definition of calculation phases.
2. Types of calculation in Plaxis 2D.
3. Water in Plaxis 2D.
4. Calculation scheme and control parameters.
5. Visualization and analysis of results.

4. DIDACTIC UNIT 4. APPLICATIONS WITH PLAXIS 2D - PRACTICAL CASES.

1. Study of a shallow foundation.
2. Analysis of the stability of a slope.
3. Modeling of an excavation between screens.
4. Construction of an embankment and consolidation.
5. Study of water flow in the terrain.

MODULE 10. TFM. MASTER INTERNATIONAL IN GEOTECHNICS AND FOUNDATIONS

Qualification

University Degree of Master of Lifelong Training in Geotechnics and Foundations with 1500 hours and 60 ECTS credits from the Catholic University of Murcia

Objectives

- Students who successfully complete the Master in Geotechnics will be able to prove that they have the necessary knowledge and skills to perform functions and develop their professional career in the field of Geotechnical Engineering in civil engineering and construction companies, both engineering, architectural studies and construction companies. Objectives:
- Reinforce and increase students' knowledge of Geotechnical Engineering.
- Provide the theoretical/practical foundations essential to perform functions in the area of geotechnics.
- Provide students with the essential tools in the field of geotechnics.
- Introducies that students can use during their work and/or academic careers in numerical modeling in Geotechnical Engineering and in advanced constitutive models for soils and rocks.

What does it prepare you for?

The program covers, in a total of nine modules, the main aspects related to this discipline. In addition to delving into the large traditional blocks, the Master also focuses on the aspect of numerical modeling in geotechnics, which is essential today to carry out responsibilities and functions in this field. In addition to providing the necessary theoretical framework, the Master will also allow students to carry out cases and practical exercises. At the end of the program, the completion of the Final Master's Project (TFM) will allow students to review and apply the most important knowledge acquired throughout it.

Who is it addressed to?

It is aimed, first of all, at professionals in the civil engineering and construction sector, which includes Civil, Canal and Port Engineers, Geologists, Geological Engineers, Mining Engineers and Architects. It is also aimed at construction professionals. Likewise, this program may be of interest to students in their final years of the aforementioned specialties, as well as students of postgraduate master's degrees and doctoral students.

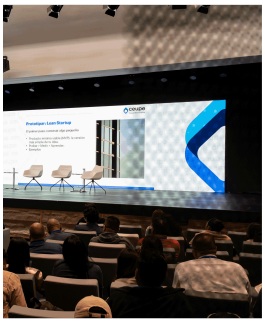
Official Character

This training is not included within the scope of official regulated training (Early Childhood Education, Primary Education, Secondary Education, Official Vocational Training FP, Baccalaureate, University Degree, Master University Officer and Doctorate). It is therefore a complementary and/or specialization training, aimed at the acquisition of certain competencies, skills or aptitudes of a professional nature, which can be assessed as merit in job boards and/or competitive examinations, always within the section of Complementary Training and/or Continuous Training. It is always essential to review the specific grading requirements of the specific public job boards to which we wish to apply.

Professional Outings

- Project engineer in consulting engineering.
- Project manager and consulting engineering.
- Project and study engineer in a construction company.
- Head of projects and studies in a construction company.
- Numerical modernization.







Live Madrid

Live the International Week

As an additional complement to your training, you can be part of the SIM: Week International in Madrid. A unique meeting that brings together students from all over the world. For seven days you can live an academic and cultural experience in the heart of Europe, culminating with the graduation ceremony in Madrid.

- Conferences and workshops with international experts
- Visits to companies and reference organizations
- Networking with students from different countries
- Cultural activities and discovery of Madrid
- graduation ceremony

Structural

Structuralia is a leading educational institution in postgraduate and highly specialized online training, focused on the fields of engineering, architecture, construction, energy, technology and digital transformation.

Founded in 2001 with a strong industrial DNA, the result of collaboration between large companies in the sector and the Universitat Politècnica de Catalunya (UPC), for more than 25 years we have accompanied technical professionals in their academic and professional development through practical, flexible training aligned with the reality of the labor market.

Our training proposal connects advanced technical knowledge, real employability and international projection, acting as key support in the professional evolution of those seeking to specialize, grow professionally and generate impact in their sector, with a firm commitment to the democratization of access to technical excellence.



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Experience in the training sector



5 stars

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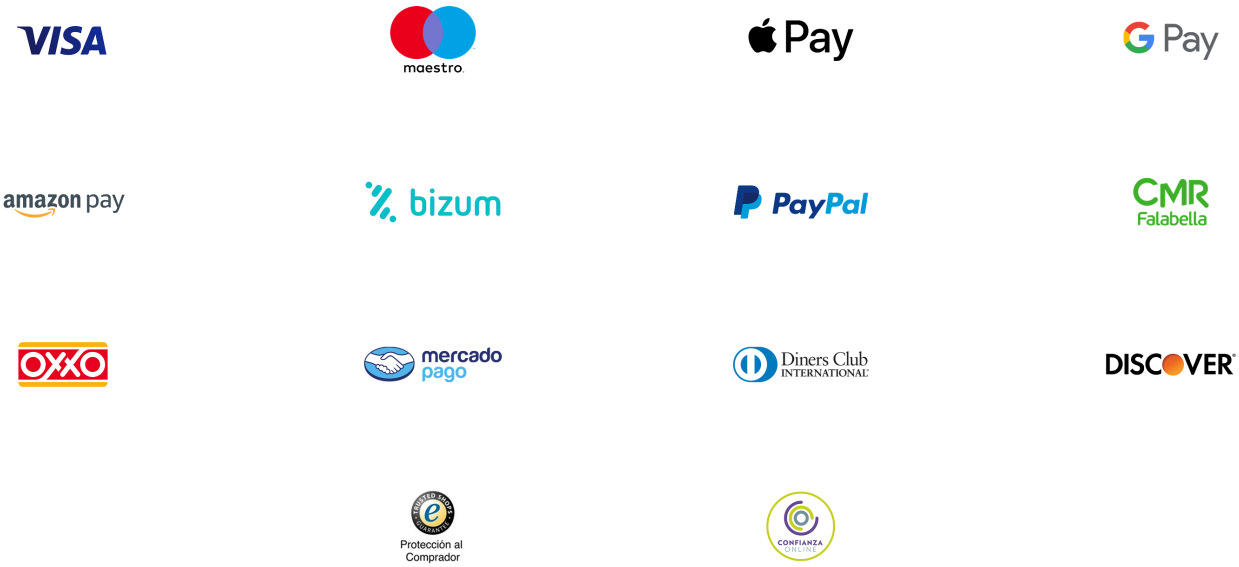
EDUCA EDTECH Group leads the digital revolution in education, promoting the continuous learning and technological transformation. The group is made up of recognized training institutions and its mission is to democratize access to education, promote the transfer of knowledge, technological development and research.

With the experience accumulated over more than 20 years, we have perfected our learning platform EDUCA LXP (Learning Experience Platform), the basis of our educational methodology, which provides students with online training practical and meaningful.



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We adapt to all international payment methods.



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15%
Scholarship recommended

20%
Functional Diversity Scholarship

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Entrepreneurship Scholarship

20%
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