

## APPLICATION FORM

Name

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Full address

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Postal Code

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Country

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Telephone contact

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E-mail

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Company / Institution

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Registration:  Participant (presential)  Participant (online)  Student

(Minimum of 15 participants)

**Payment: Instituto da Construção**

Bank transfer - IBAN: PT50 0007 0406 0012 5670 0062 6

(SWIFT/BIC: BESCPTPL – Cedofeita Agency)

Signature

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**Invoice/receipt in the name:**

Name

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Full address

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VAT nº

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**Please send to:** Manuel Carvalho (manuel@fe.up.pt)



## COURSE

# CHARACTERIZATION OF ROCK MASSES IN LARGE UNDERTAKINGS



**3-4 | May | 2022**  
**FEUP | Porto**

## SCOPE AND OBJECTIVES

The evaluation of the geomechanical parameters of rock masses in large projects is a topic of great importance given the geological complexity of the massifs and the difficulties in their evaluation. The difficulties are related to the uncertainties associated with the rock mass, whose characterization is normally carried out through in situ and laboratory tests, complemented by the use of empirical systems.

The Faculty of Engineering of the University of Porto (FEUP) will organize an Intensive Course on Characterization of Rocky Massifs in Large Undertakings, with a particular focus on geometric characterization, testing and the use of empirical systems and Data Mining techniques. A technical visit to the Venda Nova III hydroelectric scheme, by EDP – Gestão da Produção de Energia S.A., is planned.

The course will be taught by Luís Ribeiro e Sousa and Celso Lima from FEUP, Manuel Oliveira, Carlos Esteves and Nadir Plasencia, from EDP. They are specialists in the field of underground works, in large projects. The course will be in a hybrid format, online or presential format.

## LECTURERS

Luís Ribeiro e Sousa (CONSTRUCT, FEUP)

Celso Lima (FEUP)

Manuel Oliveira (Gestão da Produção de Energia – EDP)

Nadir Plasencia (Gestão da Produção de Energia – EDP)

Carlos Esteves (Gestão da Produção de Energia – EDP)

## SUPPORT

The course has the collaboration of EDP - Gestão da Produção de Energia, S.A.

## DATE AND PLACE

The Course will take place at the Faculty of Engineering of the University of Porto, on the 3<sup>rd</sup> of May 2022 and at EDP's facilities in Venda Nova on the 4<sup>th</sup> of May.

## REGISTRATION COST

Participants (presential): 100 €

Participants (online): 50 €

Post-graduate students: 50 €

Registration includes the minutes (in PDF format) and participation in the sessions.

## SECRETARIAT / INFORMATION

All questions related to the Course should be addressed to:

FEUP-DEC

Manuel Carvalho

Rua Dr. Roberto Frias, 4250-465 Porto

Tel.: 220413703

E-mail: [manuel@fe.up.pt](mailto:manuel@fe.up.pt)

## PROGRAM

### 3<sup>rd</sup> May 2022

08:30-09:00	Registration of participants and delivery of documentation.
09:00-11:00	<i>Evaluation of geomechanical properties. Deformability of rock masses (Luís Sousa)</i> Introduction. Site Investigation. Methodology for assessing the deformability of rock masses. Tests in Boreholes. Plate Tests. LFJ tests: Triaxial tests. Rock investigation in Japan.
11:00-11:30	Break
11:30-13:00	<i>Evaluation of strength and of in situ state of stress (Luís Sousa)</i> Strength assessment methodology. Sliding and shear test in situ. Cutting tests in drillholes. Laboratory tests on discontinuities. Characterization of the state of stress in situ. Hydraulic fracture. Small Flat Jack.
13:00-14:00	Lunch
14:00-16:00	<i>Empirical Systems and the Use of Artificial Intelligence (AI) Techniques (Luís Sousa)</i> Classifications by empirical Systems. RMR system. Q System. GSI System. Empirical System for Volcanic Rocks. Hierarchical characterization processes. Data Mining techniques. Applications to hydroelectric schemes and to an underground laboratory in the USA.
16:00-16:30	Break
16:30-18:30	<i>In situ investigation of Rock Masses. Venda Nova III Development (Manuel Oliveira, Nadir Plasencia, Celso Lima and Carlos Esteves)</i> General Presentation of Venda Nova III. Characterization of the Venda Nova power increase: Geological and geotechnical studies; Prospecting and testing; Classification, monitoring and behavior analysis.
18:30-19:30	<i>Discussion</i>

### 4<sup>th</sup> May 2022

08:00-22:00	<i>Technical Visit to the Venda Nova III Hydroelectric Project (Manuel Oliveira, Celso Lima, Nadir Plasencia and Carlos Esteves).</i>
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