

Rocks Mechanics

Calendar: 4th day semester

Contact Hours: T 30,0h; TP 22,5h; OT 7,5h

Scientific Area: Geotechnics

Intended learning outcomes (knowledge, skills and competences to be developed by the students):

Students should be able to: i) understand the mineralogical characteristics, the physical and mechanical properties of rocks ii) understand in-homogeneity and anisotropy of rock mass; understand the effects of fluids and its movement within the rock mass; iii) understand rock failure criteria; (iv) analyse the behaviour of rocks and rock mass in relation to its deformability and strength; (v) understand and apply the concepts of stress state in rock masses.

Skills and competences: organized and systematic thinking; analytical capacity; critical thinking and innovative sense; inductive reasoning; effective communication in mother tongue; appropriate use of information technologies and communication; development of consistent and coherent proposals for solving technological problems.

Syllabus:

1. Rock Mechanics. Introduction.
2. Mineralogical characteristics, physical and mechanical properties of rocks.
3. Rock mass. In-homogeneity and anisotropy. Jointed rock masses. Discontinuities sets. Methods of representing orientation of discontinuities and statistical analysis. Quantitative description of discontinuities in rock masses. Water within discontinuities and fluid flow in porous media. Permeability. Field tests.
4. Failure criteria.
5. Rock strength: uniaxial compressive strength, tensile strength; discontinuities' shear strength; laboratory and field tests.
6. Deformability of rocks and rock masses: rheological models, laboratory and field tests.
7. State of in situ stress: concept and tests on rock mass.

Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

Syllabus just fit to learning outcomes exhibited by the following correspondence: 1 and 2 with i); 1 and 3 with ii); 1 and 4 with iii); 1, 5 and 6 with iv); 1 and 7 with v).

References:

1. Rocha, M. Mecânica das Rochas. LNEC, 1981. Lisboa.
2. Goodman, R. Introduction to Rock Mechanics. John Wiley & Sons, 1988 (2nd ed.), New York.
3. Hudson. J. Rock Mechanics Principles in Engineering Practice. Butterworths, 1989, London.
4. Fjaer, E., Holt, R., Horsrud, P., Raaen, A., Risnes, R. Petroleum Related Rock Mechanics. 2nd Edition. Elsevier, 2008.