

Study Plan

- **School:** School of Sciences and Technology
- Degree: *** TRANSLATE ME: Pós-Graduação ***
- Course: Geoarcheology (cód. 707)

1st Year - 1st Semester

| Component code | Name | Scientific Area Field | ECTS | Duration | Hours |
|----------------|--|-----------------------|------|----------|-------|
| | Geolgical Mapping Applied to Archaeology | Geology | 6 | Semester | 156 |
| GEO13668O | | | | | |
| | Geomorphology applied to Archeology | Geography | 3 | Semester | 78 |
| GEO13679O | | | | | |
| | Materiais Geológicos e Arqueológicos | Archeology Geo- | 3 | Semester | 78 |
| GEO13680O | | logy | | | |
| | Geophysics Applied to Archeology | Physics | 6 | Semester | 156 |
| FIS136810 | | | | | |
| | Sedimentary Processes and Environments | Geology | 3 | Semester | 78 |
| GEO13682O | | | | | |
| | Pedology applied to Archeology | *** TRANSLATE | 3 | Semester | 78 |
| GEO13683O | | ME: Ciências do | | | |
| | | Solo *** | | | |
| | Archaeology – Culture and Context | Archeology | 3 | Semester | 78 |
| HIS10511M | | | | | |
| | Fieldwork in Geoarcheology I | Archeology Phy- | 3 | Semester | 78 |
| HIS13684O | | sics Geology | | | |

1st Year - 2nd Semester

| Component code | Name | Scientific Area Field | ECTS | Duration | Hours |
|----------------|---|-----------------------|------|----------|-------|
| | Methods and Techniques of Archaeological Excavation | Archeology | 6 | Semester | 156 |
| HIS10512M | | | | | |
| | GIS Tools Applied to Heritage Studies | Geology | 6 | Semester | 156 |
| GEO13685O | | | | | |
| | Petrography | Geology | 6 | Semester | 156 |
| GEO13686O | | | | | |
| | Analysis Techniques in Archeometry | Geology | 6 | Semester | 156 |
| GEO13687O | | | | | |
| | Seminar in Geoarcheology | Archeology Geo- | 3 | Semester | 78 |
| HIS13688O | | logy | | | |
| | Fieldwork in Geoarcheology II | Archeology Phy- | 3 | Semester | 78 |
| HIS13689O | | sics Geology | | | |

Conditions for obtaining the Degree:

*** TRANSLATE ME: Para aprovação na componente curricular é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares:

- 1.º Ano
- 1º Semestre:
- 8 UC obrigatórias num total de 30 Ects
- $\{\, \backslash\,\}\, \mathsf{newline}$
- 2^e Semestre:
- 6 UC obrigatórias num total de 30 Ects
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Geolgical Mapping Applied to Archaeology (GEO13668O)

Basic principles of cartography, methods and main types of maps. Examples of Portuguese maps.

The shape of the Earth: coordinate systems, projection systems and geographical referencing systems. North geographic, magnetic and cartographic, types of scales, methods of relief representation.

Lithological units and cartographic units. Criteria for the definition of geological boundaries. Lithostratigraphic and chronostratigraphic maps.

Basic principles of stratigraphy. Stratigraphic units used in geological maps. Subdivisions in the system, series and stage. Definition of unit, group, formation, member and layer.

Types of contacts between geological units and associated cartographic patterns: stratigraphic contacts, unconformities, intrusive contacts, faults.

Analysis and interpretation of geological maps. The use of the Explanatory Note of the map. Realization of a final field trip in order to apply concepts acquired throughout the semester.

Back

Geomorphology applied to Archeology (GEO136790)

Forms of relief that support the landscape (plain, plateau, depression, escarpment, slope, Reading the landscape through hypsometric characteristics, shape of basins and properties of the hydrographic network.

The dynamics of slopes, erosive processes and colluvium production, interaction of slopes with the river system. Interaction of the climatic system in the dynamics of the slopes and in the river system.

Functioning of the river system, processes of aggradation and incision. The morphology of the river channels. Meaning of the change in channel morphology over time (climatic, tectonic and anthropic influences). Main controls of the river system (variations of the base level, tectonics and climate). Formation of river terraces.

River terraces as preservation archives for archaeological finds. Main problems in the use of archaeological findings for dating sedimentary records. The importance of absolute dating in dating sedimentary records.

Karst geomorphology and formation of caves.

Back

Materiais Geológicos e Arqueológicos (GEO136800)

- 1 Introduction to geological processes:
- 1.1 Earth dynamics
- 1.2 Rock cycle
- 1.3 Geological and archaeological, materials
- 2 Geological materials:
- 2.1 Minerals
- 2.2 Igneous rocks
- 2.3 Sedimentary rocks
- 2.4 Metamorphic rocks
- 3 Archaeological materials:
- 3.1 Lytic materials
- 3.2 Ceramic materials
- 3.3 Glass and pigments
- 3.4 Mortars
- 3.5 Metals



Geophysics Applied to Archeology (FIS136810)

General information about Archaeological problems solved by the Geophysics Types of geophysical surveys and their limitations General methods and tools to process and interpret geophysical data: filtring interpolation and gridding Electric resistivity method Brief physical foundation of resistivity method Electric properties of geological rocks and archaeological targets Electric resistivity survey methods Analysis of resistivity maps Quantitative interpretation of resistivity anomalies Application of resistivity method in archaeology Ground penetrating radar (GPR) Physical principles of GPR GPR survey methods 3-D modeling on practice Examples of GPR application at various archaeological sites Magnetometry Brief physical foundation of magnetometry method Magnetic properties of geological rocks and archaeological targets Magnetic and Gradiometric survey methods Analysis of magnetometry maps Quantitative interpretation of magnetic anomalies Application the method in archaeology Electroma

Back

Sedimentary Processes and Environments (GEO13682O)

Theoretical-practical lessons include the following syllabus: main processes of the Earth's external geodynamics; genetic classification of sedimentary rocks; physical properties of sedimentary rocks; porosity and permeability; diagenesis; weathering as part of erosion; sedimentary transport and flow dynamics in surface processes; erosion, hydrology, and evolution of landforms; regolith and mass movements; depositional environments (continental, transition, and marine); erosion-deposition cycles; sedimentation and evolution of landforms in the Quaternary (control factors: variations in the average seal level and climatic variations); Use of methods to study clastic sediments and carbonated deposits (including deposits at archaeological sites and speleothems) applied to the reconstruction of paleoenvironments.

Back

Pedology applied to Archeology (GEO13683O)

Soil functions and soils in space and time. Soil profile, horizons and materials and their morphology (macro and micro). Soils mineral and organic constituents. Soil chemical and physical properties. Factors and processes of soil formation and evolution. Basics of soil classifications. Soil mapping and soil information systems. Applications of soil science in archaeology: case studies.



Archaeology – Culture and Context (HIS10511M)

The telltale traces of human activity over time:

- 1. Prehistory old;
- 2. Prehistory recent;
- 3. Protohistory;
- 4. Roman period;
- 5. Medieval and modern period;
- 6. Contemporary period.

Back

Fieldwork in Geoarcheology I (HIS136840)

The main programmatic lines are:

- Acquisition of basic content on topography;
- Acquisition of basic content on geophysics;
- Knowledge and skills related to fieldwork;
- Data interpretation and reporting.

Back

Methods and Techniques of Archaeological Excavation (HIS10512M)

The different types of excavation: excavation of the survey area; Excavations / polls minimization;

The Drawing Field;

Reports: text, maps, photographs, drawings, field

The scientific articles

Back

GIS Tools Applied to Heritage Studies (GEO13685O)

- 1. Introduction to GIS organization and output.
- 2. New data acquisition and input methods.
- 3. Thematic maps, buffers, and overlays.
- 4. Representing results using maps.
- 5. Rasters, surfaces, and continuous data.
- 6. Predictive locational modeling.
- 7. Quantifying patterns.
- 8. Heritage studies and GIS.
- 9. Using geophysics tools with GIS.
- 10. Cost-surfaces and viewshed analysis.
- 11. Web mapping and outreach.
- 12. Mobile GIS.
- 13. Using drones in heritage studies.
- 14. Study case.



Petrography (GEO13686O)

1 - Basic concepts of light, optics, components of the petrographic microscope, optical properties of minerals in the petrographic microscope.

2 - Manufacture of thin section and cross sections.

3- Main minerals in thin section. Petrography of igneous, sedimentary and metamorphic rocks using conventional microscopy (petrographic microscope).

4 - Petrography of igneous, sedimentary and metamorphic rocks and archaeological objects by scanning electron microscopy (SEM / EDS).

5 - Image analysis (e.g. quantification of phases and porosities).

6 - Integration of petrographic analysis of archaeological materials for the resolution of archaeological problems (e.g. identification and provenance of raw materials, production techniques)

Back

Analysis Techniques in Archeometry (GEO136870)

Techniques of chemical and mineralogical analysis of archaeological materials contextualized in archaeological issues such as study of provenance, production techniques or production centers. General concepts of Archeometry; Analysis / microanalysis techniques; Sampling and sample preparation; Destructive, micro-destructive and non-destructive analysis; Resolution, precision and sensitivity; Basic principles of electromagnetic radiation, electrons, protons, Xrays, interaction with matter; Scanning electron microscopy combined with microanalysis; Xray diffraction; Mass spectroscopy Mass spectroscopy Fourier Transform Infrared Spectroscopy; micro-Raman Spectroscopy; Thermal analysis; Dating of archaeological materials.

Back

Seminar in Geoarcheology (HIS13688O)

The syllabus contents of this curricular unit are not predefined and result from the themes and research domains that are chosen annually to be discussed with students, in order to provide them with a wide range of knowledge, in order to promote a interdisciplinary knowledge.

Back

Fieldwork in Geoarcheology II (HIS13689O)

The main programmatic lines are:

- Acquisition of basic content on topography;
- Acquisition of basic content on geophysics;
- Knowledge and skills related to fieldwork;
- Data interpretation and reporting.