



Study Plan

School: School of Sciences and Technology

Degree: Bachelor

Course: Geology (cód. 135)

Branch Geology

1st Year - 1st Semester

Branch Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS02670L	General Physics	Physics	6	Semester	156
GEO00749L	General Geology	Geosciences	6	Semester	155
MAT00933L	Mathematics I	Mathematics	6	Semester	162
QUI01090L	General Chemistry	Chemistry	6	Semester	156
BIO02671L	Introduction to Biology Studies	Biology	3	Semester	78
PAO02672L	Basic Ecology	Environment and Ecology Sciences	3	Semester	78

1st Year - 2nd Semester

Branch Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02673L	Field Techniques in Geosciences	Geosciences	6	Semester	156
GEO02674L	Paleontology	Geosciences	6	Semester	156
MAT00934L	Mathematics II	Mathematics	6	Semester	162
GEO02675L	Geological Cartography I	Geosciences	6	Semester	156
GEO02676L	Mineralogy	Geosciences	6	Semester	156

2nd Year - 3rd Semester

Branch Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02677L	Igneous Petrology	Geosciences	6	Semester	156
GEO02678L	Sedimentology	Geosciences	6	Semester	156
MAT00925L	Introduction to Probability and Statistics	Mathematics	6	Semester	154
GEO10081L	Structural Geology	Geosciences	6	Semester	160
GEO10079L	Pedology	Geosciences	6	Semester	156



2nd Year - 4th Semester
Branch Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO00745L	Engineering Geology	Geosciences	6	Semester	159
GEO02679L	Metamorphic Petrology	Geosciences	6	Semester	156
GEO00761L	Geochemical Systems	Geosciences	6	Semester	156
GEO02680L	Stratigraphy	Geosciences	6	Semester	156
GEO00754L	Hydrogeology	Geosciences	6	Semester	156

3rd Year - 5th Semester
Branch Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02376L	Geomorphology	Geography	6	Semester	156
FIS00708L	Applied Geophysics	Physics	6	Semester	156
GEO02682L	Mineral Resources	Geosciences	6	Semester	156

Group of Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO01448L	Geology of Portugal	Geosciences	6	Semester	156
GEO02684L	SIGS in Geosciences	Geosciences	6	Semester	156

Group of Free Options

3rd Year - 6th Semester
Branch Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02685L	Geodynamics and Tectonics	Geosciences	6	Semester	156
GEO02686L	Geological Cartography II	Geosciences	6	Semester	156
GEO00750L	Marine Geology	Geosciences	6	Semester	156
GEO01440L	Environment Geology and Regional Planning	Geosciences	6	Semester	156
GEO02687L	Seminar	Geosciences	6	Semester	156

Branch Biology and Geology

1st Year - 1st Semester
Branch Biology and Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIS02670L	General Physics	Physics	6	Semester	156
GEO00749L	General Geology	Geosciences	6	Semester	155



1st Year - 1st Semester
Branch Biology and Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
MAT00933L	Mathematics I	Mathematics	6	Semester	162
QUI01090L	General Chemistry	Chemistry	6	Semester	156
BIO02671L	Introduction to Biology Studies	Biology	3	Semester	78
PAO02672L	Basic Ecology	Environment and Ecology Sciences	3	Semester	78

1st Year - 2nd Semester
Branch Biology and Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02673L	Field Techniques in Geosciences	Geosciences	6	Semester	156
GEO02674L	Paleontology	Geosciences	6	Semester	156
MAT00934L	Mathematics II	Mathematics	6	Semester	162
GEO02675L	Geological Cartography I	Geosciences	6	Semester	156
GEO02676L	Mineralogy	Geosciences	6	Semester	156

2nd Year - 3rd Semester
Branch Biology and Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02677L	Igneous Petrology	Geosciences	6	Semester	156
GEO02678L	Sedimentology	Geosciences	6	Semester	156
MAT00925L	Introduction to Probability and Statistics	Mathematics	6	Semester	154
GEO10081L	Structural Geology	Geosciences	6	Semester	160
BIO10917L	Cell Biology	Biological Sciences	6	Semester	156

2nd Year - 4th Semester
Branch Biology and Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02679L	Metamorphic Petrology	Geosciences	6	Semester	156
GEO00761L	Geochemical Systems	Geosciences	6	Semester	156
GEO02680L	Stratigraphy	Geosciences	6	Semester	156
BIO00408L	Microbiology	Biological Sciences	6	Semester	156
BIO02681L	Invertebrate Biology	Biology	6	Semester	156



3rd Year - 5th Semester
Branch Biology and Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO01448L	Geology of Portugal	Geosciences	6	Semester	156
GEO02682L	Mineral Resources	Geosciences	6	Semester	156
BIO02688L	Vertebrates Biology	Biology	6	Semester	156
BIO02689L	Plant Biology without Seeds	Biology	6	Semester	156
Group of Free Options					

3rd Year - 6th Semester
Branch Biology and Geology

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
BIO02690L	Molecular Biology	Biology	6	Semester	156
BIO00301L	Human Biology	Biology	6	Semester	156
BIO02691L	Plant Biology with Seeds	Biology	6	Semester	156
GEO02687L	Seminar	Geosciences	6	Semester	156
Group of Options					
Component code	Name	Scientific Area Field	ECTS	Duration	Hours
GEO02685L	Geodynamics and Tectonics	Geosciences	6	Semester	156
GEO00750L	Marine Geology	Geosciences	6	Semester	156
GEO01440L	Environment Geology and Regional Planning	Geosciences	6	Semester	156



Conditions for obtaining the Degree:

*** TRANSLATE ME: Geologia

Para obtenção do grau de licenciado em Geologia Ramo em Geologia é necessário obter aprovação a 168 ECTS em unidades curriculares obrigatórias e 12 ECTS em unidades curriculares optativas, distribuídas da seguinte forma:

1º Ano

1º Semestre:

6 UC Obrigatórias num total de 30 ECTS

2º Semestre

5 UC Obrigatórias num total de 30 ECTS

2º Ano

3º Semestre

5 UC Obrigatórias num total de 30 ECTS

4º Semestre

5 UC Obrigatórias num total de 30 ECTS

3º Ano

5º Semestre

3 UC Obrigatórias num total de 18 ECTS

1 UC Optativa num total de 6 ECTS

1 UC Optativa livre num total de 6 ECTS

6º Semestre

5 UC Obrigatórias num total de 30 ECTS

Para obtenção do grau de licenciado em Geologia Ramo em Biologia e Geologia é necessário obter aprovação a 162 ECTS em unidades curriculares obrigatórias e 18 ECTS em unidades curriculares optativas, distribuídas da seguinte forma:

1º Ano

1º Semestre:

6 UC Obrigatórias num total de 30 ECTS

2º Semestre

5 UC Obrigatórias num total de 30 ECTS

2º Ano

3º Semestre

5 UC Obrigatórias num total de 30 ECTS

4º Semestre

5 UC Obrigatórias num total de 30 ECTS

3º Ano

5º Semestre

4 UC Obrigatórias num total de 24 ECTS

1 UC Optativa livre num total de 6 ECTS

6º Semestre

4 UC Obrigatórias num total de 24 ECTS

1 UC Optativa num total de 6 ECTS ***

Program Contents



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General Physics (FIS02670L)

Chapter 1. Physics as a science and Review of fundamental physics-mathematical concepts;

Chapter 2. Space and Time - motion of the particle

Chapter 3. Dynamics of particle;

Chapter 4. Work and Energy;

Chapter 5. Dynamic of particle system;

Chapter 6. Static;

Chapter 7. Deformation and elasticity;

Chapter 8. Fluids;

Chapter 9. Thermodynamics;

Chapter 10. Heat and Mass Transfer.

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General Geology (GEO00749L)

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Mathematics I (MAT00933L)

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General Chemistry (QUI01090L)

1. Constitution of matter

2. Periodic table

3. Chemical bonding

4. States of aggregation of matter

5. Solutions

6. Chemical thermodynamics

7. Chemical equilibrium

8. Equilibrium in heterogeneous systems

9. Ionic equilibria in homogeneous systems: acid-base

10. Electrochemistry

11. (Optional Chapter)

Chemistry of life

Chemical corrosion

Chemical kinetics

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Introduction to Biology Studies (BIO02671L)

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Basic Ecology (PAO02672L)

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Field Techniques in Geosciences (GEO02673L)



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Paleontology (GEO02674L)

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Mathematics II (MAT00934L)

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Geological Cartography I (GEO02675L)

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Mineralogy (GEO02676L)

1. Introduction: History and evolution of Mineralogy.{}newline
2. Concept of mineral: Mineral and crystal concepts. State types of matter.{}newline
3. Elementary crystallography: 2-D Symmetry, 2-D plane lattices and plane groups. 3-D Symmetry, crystallographic systems, Bravais lattice and 3-D point groups. Introduction to 3-D space groups. Crystal morphology, Miller index and crystallographic form. Introduction to x-ray crystallography and crystal axes. Twinning.
4. Crystal-chemistry: Ionic radius, coordination number and polyhedron coordination.{}newline
5. Physical properties of minerals: Color, luster, streak, habit, hardness, cleavage, fracture and magnetism.{}newline
6. Crystal-optics: Optical properties of minerals in polarized light. Opaque, isotropic, uniaxial and biaxial anisotropic minerals.{}newline
7. Systematic Mineralogy: Introduction to mineral systematic. Notions of class, family, group, specie and mineral series.
8. Non silicates systematic: Native elements, halides, sulfates, carbonates, phosphates, sulfides, oxides and hydroxides.
9. Silicates systematic: Nesosilicates, sorosilicates, cyclosilicates, single chain inosilicates, double chain inosilicates, phyllosilicates and tectosilicates.

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Igneous Petrology (GEO02677L)



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Sedimentology (GEO02678L)

- The Sedimentology in the framework of the Geology;
 - The importance of the Sedimentology in the Geology, Environmental Sciences and the Industrial Exploration. Formation and systematic of the sediments and the sedimentary rocks;
 - Study methods of the sediments and sedimentary rocks;
 - Sedimentary structures
 - Hydrodynamics and the sedimentation
 - Sedimentary environments:
 - o Continental
 - § Aeolian
 - § Fluvial
 - § Alluvial
 - § Lacustrine
 - o Transitional
 - § Estuarine
 - § Deltaic
 - § Lagoon
 - § Coastal
 - o Marine
 - § Carbonate platform
 - § Siliciclastic platform
 - § Pelagic sedimentation.
 - Sedimentary cycles
 - Diagenetic processes
- Portuguese sedimentary basins through the geological time.

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Introduction to Probability and Statistics (MAT00925L)

Descriptive Statistics Basic Probability Notions Conditional probabilities and independence Random Variables and Vectors More important Discrete and Continuous distributions Statistical Inference (parametric and non parametric) Linear Regression Analysis

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Structural Geology (GEO10081L)

Theoretical: 1 - Basic concepts of structural geology; 2 - Dynamic analysis; 3 - Kinematic analysis; 4 - Mechanical behavior of rocks, 5 - Descriptive Analysis and Classification: faults, folds, shear zones, joints and diaclasses; 6 - Relationship between Structural Geology and tectonics.

Theoretical and Practical: 1. Using geometric and statistical stereographic projection in structural geology, 2. Structural interpretation of geological maps, including the identification, description and interpretation of structures at various scales, as well as understanding the processes that originate them.

Fieldwork: Study visits for consolidation of knowledge. Annually two days of field work are planned in places where the conditions of the various geological structures allow excellent observation and interpretation.

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Pedology (GEO10079L)

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Engineering Geology (GEO00745L)



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Metamorphic Petrology (GEO02679L)

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Geochemical Systems (GEO00761L)

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Stratigraphy (GEO02680L)

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Hydrogeology (GEO00754L)

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Geomorphology (GEO02376L)

INTRODUCTION: Geomorphology (structural, dynamic and climatic).

Main geomorphological features on Earth.

ROCK WEATHERING: Lithological, climatic and structural control.

FROM THE HYDROLOGICAL CYCLE TO THE FLUVIAL MODELING: Areolar versus linear erosion. Erosion and accumulation forms related with fluvial processes. Planation surfaces and river terraces.

SLOPE FORMS: From the slope evolution to its shape.

FROM COASTAL DYNAMICS TO COASTAL MODELING: Forms of coastal erosion and accumulation. Sea level variations and marine terraces.

GLACIAL EROSION SYSTEMS: Forms of modeling glacial and periglacial regions.

AEOLIAN EROSION: From wind environments to forms of wind accumulation and erosion.

STRUCTURAL RELIEF: The influence of lithology and geological structure.

PRACTICAL ACTIVITIES

Geomorphological interpretation of topographic maps: surface and profile analysis; planation surfaces characterization.

Introduction to photo interpretation and to MDT.

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Applied Geophysics (FIS00708L)



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Mineral Resources (GEO02682L)

Introduction to the geological resources: definitions; the geological context; their use;
Global economy of the geological resources;
The geology of the mineral resources in the broader context of the Earth sciences;
Mineral exploration: Geophysical methods; Geochemical methods; Geochemical anomalies; Primary halos; Secondary halos;
Energy resources: importance, types, production and consumption;
Metallic ores: Methods of study: fluid inclusions and stable isotopes.
Orthomagmatic ores;
Disseminated and stockwork deposits;
Skarns;
Vein ores;
Massive sulphides;
Sedimentary ores;
Portuguese examples;
Marine mineral resources: Abyssal plains; Continental platform.

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Geology of Portugal (GEO01448L)

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SIGS in Geosciences (GEO02684L)

GIS and the sciences.
Graphical representations; Projection Systems; Georeferencing; Scanning information.
. Computer georeferenced data.
. Symbols and Labels in GIS.
. Creation of Layouts.
. Scanning of points and lines.
. Creating and editing symbols.
. Layer Files type.
. Georeferencing.
. Digitizing polygons.
. Creating layouts.
. Information search the tools and basic SQL Databases.
. Rules for creating maps.
. Small GIS project.

NOTE: The theoretical and practical work will make use of practical examples ranging from applications to the study of the territory, the characterization of the terrain, geology and natural resources of a region.

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Geodynamics and Tectonics (GEO02685L)

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Geological Cartography II (GEO02686L)



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Marine Geology (GEO00750L)

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Environment Geology and Regional Planning (GEO01440L)

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Seminar (GEO02687L)

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Cell Biology (BIO10917L)

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Microbiology (BIO00408L)

Theoretical:

1. Historical context and Ubiquity
2. Diversity of the Microbial World
3. Microbial Growth and Death
4. Metabolism
5. Basics of Molecular Microbiology: Microbial genetics, Virology, Immunology
6. Microbes and disease; Normal flora, Pathology, infection and disease, Mechanisms of pathogenicity, Principles of epidemiology
7. Food microbiology: Hygiene and concept of indicator. Processing and storage of food. Foodborne diseases
8. Ecology and environmental microbiology: Soil and water, Biogeochemical cycles, Agricultural applications, Wastewater treatment, Biotechnology applications

Lab Practice:

Aseptic practice

Observation of bacteria, fungi and protists.

Demonstration of Ubiquity

Preparation and sterilization of culture media.

Isolation of pure culture.

Colonial and cellular morphology. Staining methods

Microbial counts

Environmental conditions for growth (pH, temp., O₂)

Anaerobic Culture

Antibiograms

Microbial spreading simulation

Water and milk analyses

Plant symbiosis.



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Invertebrate Biology (BIO02681L)

With the first six lectures aim to achieve the following objectives: (1) Set some basic terminology, (2) introduce some new concepts, (3) To present some of the subjects will develop over the course. In other classes, these issues continue to be present, but now, in a comparative inter-and intra fee. The laboratory practical classes and their sequence, follow the thematic development of the program of lectures, reinforcing and complementing the learning process on the morphology and functional anatomy of the major invertebrate taxa. The first eight practical lessons will be dedicated to the study of morphology and functional anatomy of: Protozoa, sponges, cnidarians, flatworms, pseudocoelomate (nematodes and rotifers), annelids and arthropods (Queliceriformes, Myriapoda and insects). In the remaining laboratory classes will be studied the: Arthropods (Crustaceans - barnacles and Decapods), molluscs (Gastropoda Prosobrânquios, bivalves and cephalopods) and Echinodermata.

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Vertebrates Biology (BIO02688L)

1. Levels of organization, morphological and functional characteristics, classification and general characteristics of the vertebrates.
2. Classification and phylogeny of the Agnatha.
3. Definition and classification of the Chondrichthyes.
4. Definition, classification, evolutionary history and diversity of the Osteichthyes.
5. Origin, classification and phylogeny of Amphibia.
6. Origin and Adaptive Radiation of Reptilian Groups.
7. Definition and classification of the birds.
8. Definition and classification of the mammals.

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Plant Biology without Seeds (BIO02689L)

1. The evolution in the plant kingdom - Diversity and characteristics of major groups. Understanding plant taxonomy.
2. Cyanophyta - blue-green algae.
3. Protists: Euglenophyta, Rhodophyta, Dinophyta, and Myxomycota Protista II: Chlorophyta, Bacillariophyta, Phaeophyta, and Chrysophyta Oomycota.
4. Fungi: Ascomycota, Basidiomycota, Zygomycota and Deuteromycota.
5. Colonization of Earth. Comparison between aquatic and terrestria.l
6. Antocerophyta, and Bryophyta Hepatophyta.
7. Evolution of Tracheophyta. Fossil records.
8. Psilotophyta, lycophyte, Sphenophyta and Pteridophyta.

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Molecular Biology (BIO02690L)

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Human Biology (BIO00301L)

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Plant Biology with Seeds (BIO02691L)

LECTURES: 1. Morphofunctional organization of the seed plant body; 2. Adaptations to different environments; 3. Taxonomy and evolution of seed plants; 4. Principles of phytogeography.
LAB: 1. Comparative study of seed plant adaptations; 2. Collecting, pressing, drying and mounting plant specimens; 3. Recognition of flowering plant families; 3. Application of methodologies and cases study.