# SUBJECT TEACHING GUIDE

## G391 - GEOLOGY

## Degree in Mining Resources Engineering

Academic year 2020-2021

| 1. IDENTIFYING DATA | | | | | |
|---|---|---|---|---|---|
| Degree | Degree in Mining Resources Engineering | | | Type and Year | Core. Year 1 |
| Faculty | | | | | |
| Discipline | Subject Area: Geology<br>Basic Training Module | | | | |
| Course unit title and code | G391 - GEOLOGY | | | | |
| Number of ECTS credits allocated | 6 | Term | | Semester based (2) | |
| Web | | | | | |
| Language of instruction | Spanish | English Friendly | No | Mode of delivery | Face-to-face |

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| Department | DPTO. CIENCIAS DE LA TIERRA Y FISICA DE LA MATERIA CONDENSADA |
| Name of lecturer | LAURA RODRIGUEZ RODRIGUEZ |
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| Other lecturers | PATRICIO MARTINEZ CEDRUN |

| 3.1 LEARNING OUTCOMES |
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| - To demonstrate knowledge and understanding in an area of study that is at the core of general secondary education , and is often at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study. |
| - To acquire general and specific competences, as well as basic and fundamental knowledge for students' training. |
| - To know, understand and be able to use basic knowledge in geology and geomorphology, applying that knowledge to solve engineering problems. To understand the influence of climate in the genesis and evolution of geological materials and landscape. |
| - To be able to understand and carry out basic geological studies and works. |
| - To know the methods and techniques for geological mapping. |

## 4. OBJECTIVES

According to the general objectives, the Degree must include “geological investigation and prospecting, as well as mining of geological resources, including ground water”. Therefore, the students need to acquire the basic knowledge necessary to understand the processes that affect both, the surface and interior of the Planet and the genesis of geological materials.
Similarly, students need to be able to apply that knowledge to solve problems related to mining and civil engineering activities and to understand the subsequent environmental impacts.
On the other hand, it is also intended that students acquire the ability to relate and communicate with other professionals, in multi and interdisciplinary teams, in order to address the complex technical issues, which require multidisciplinary responses.

| 6. COURSE ORGANIZATION | |
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| CONTENTS | |
| 1 | GENERAL CONCEPTS |
| 1.1 | T-1.- Geology: scope. Geological research. Science and scientific method in Geology. Geologic time scale and dating. Geologic principles. |
| 1.2 | T-2.- The Earth: origin, composition and structure. Temporal evolution of the Earth. Earth's interior: structure. Geodynamic processes. Earth magnetic field. |
| 1.3 | T-3. Earth crust: materials and structure. Minerals; properties of minerals; mineral classification. Rocks and petrogenic cycle; rock types. Rock bodies; intrusive bodies. Stratigraphic strata and discontinuities. Structural geology. Stress-strain: folds and faults; types. |
| 2 | GEOLOGICAL MAPPING AND PLATE TECTONICS |
| 2.1 | T-4.- Geological maps; types and applications. Topographical maps used for geological mapping. Bedding strike and dip. Representation of horizontal and tilted layers. Real and apparent thickness. Topographical profile and geological cross sections. Geological maps: types, elements and symbology. Geological map elaboration and interpretation. Application of Geographical Information Systems (GIS) to geological mapping. |
| 2.2 | T-5.- Plate tectonics, mountain formation, volcanos and earthquakes. Geodynamics, continental drift, paleomagnetism, seafloor spreading, plate boundaries and types. Evolution of continents and oceans. Wilson's cycle. Mountain formation. Volcanoes and igneus activity. Volcanic eruptions and types of expelled materials. Volcanic morphology, types of volcanoes. Volcanic activity in Spain. Earthquakes. Seismology. Types on seismic waves. Scales of seismic magnitude and intensity. Seismicity in Spain. Earthquake resistant regulations and engineering geology. |
| 3 | GEODYNAMIC PROCESSES AND LANDFORMS |
| 3.1 | T-6. Geomorphology. Landscape geometry and structure. Landscape evolution. Weathering and soils. Sediments. |
| 3.2 | T-7.- Earth surface processes. Atmospheric circulation. Climatic zones and geomorphic environments. Humid intertropical environments, arid, temperate, glacial and periglacial environments. Climatic change: magnitude, trends and causes. |
| 3.3 | T-8.- Processes and landforms in cold and arid environments. Periglacial environments, processes, forms and sediments. Glacial environments, processes, forms and sediments. Wind and arid environments, forms and sediments. Engineering geology on arid and cold environments. |
| 3.4 | T-9.- Surface hydrologic processes. Hydrologic cycle. Hydrologic equation. Surface water and stream flow. Erosion and sediment transport. Fluvial sediments. Drainage network and types of fluvial basins. Engineering geology on Surface waters. |
| 3.5 | T-10.- Ground-water. Ground-water flow. Aquifers and aquicludes. Water table and piezometric surface. Karst. Surface and underground karstic forms and deposits. Engineering geology on ground water and karst. |
| 3.6 | T-11.- Slope processes. Slope erosion and evolution. Stability and instability. Conditioning and triggering factors. Mass movements: mechanisms and types. Engineering geology on natural and artificial slopes. |
| 3.7 | T-12.- Coastal dynamics. Coastal processes. Types of coasts. Erosive and depositional forms. Engineering geology on coastal areas. |
| 3.8 | T-13.- Geodynamics and landscape morphology. Structural and lithological landforms. |
| 3.9 | T-14.- Geology of Spain and Cantabria. Geological setting of the Iberian Peninsula. Iberian Peninsula and plate tectonics. The main geological units in the Iberian Peninsula. Geological synthesis of Cantabria. Stratigraphic succession in Cantabria. Tectonics in Cantabria, principal geological structures. Geological resources in Cantabria. |
| 3.10 | T-15.- Geology and Engineering geology. The terrain in Spanish and European engineering regulations. Engineering geology methods and techniques. Geological factors and their influence on engineering. Geologic data for engineering projects. Engineering geology maps. |
| 4 | Mentoring and evaluation |

## 7. ASSESSMENT METHODS AND CRITERIA

| Description | Type | Final Eval. | Reassessn | % |
|---|---|---|---|---|
| Laboratory practical work. | Laboratory evaluation | No | Yes | 20,00 |
| Final exam (technical/practical) | Written exam | Yes | Yes | 50,00 |
| Report's evaluation. | Work | No | Yes | 15,00 |
| Course work. | Activity evaluation with Virtual Media | No | Yes | 15,00 |
| TOTAL | | | | 100,00 |

**Observations**

Attendance to laboratory sessions, as well as the completion of course work course are mandatory for all students. If the student must take the September's recovery exam, grades previously obtained for laboratory and course work will be saved for the final score during the academic year. If the minimum mark required in the written examination is not achieved, the overall mark shall be the lowest value between 4.9 and the weighted average of all the assessment tests.

**Observations for part-time students**

For partial enrollment students, laboratory practical work is obligatory. Laboratory and course work reports are also compulsory.

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

**BASIC**

Módulos 1,2 y 3:
1) E.J. Tarbuck y F.K. Lutgens (2005). Ciencias de la Tierra: Una Introducción a la Geología Física. Ed. Prentice Hall, Madrid.
2) J.S. Monroe, R. Wicanter y M. Pozo (2008). Geología. Dinámica y Evolución de la Tierra. Ed. Paraninfo.
3) F. Bastida (2005). Geología, una visión moderna de las Ciencias de la Tierra. Ed. Trea.
4) F.G.H. Blyth y M.H. de Freitas (2003). Geología para ingenieros. Ed. Cía. Editorial Continental.
Módulo 3:
5) J. Pedraza (1996). Geomorfología. Principios, métodos y aplicaciones. Ed. Rueda.
6) M. Gutiérrez Elorza (2008). Geomorfología. Ed. Pearson-Prentice Hall.
7) L.I. González de Vallejo (Coord.) (2002). Ingeniería geológica. Ed. Prentice Hall. Madrid, 715.
8) J. López Marinas (2006). Geología aplicada a la ingeniería civil. Ed. Dossat 2000. Madrid, 564.
9) M. Ruiz y S. González (2001). Geología aplicada a la ingeniería civil. Ed. Limusa. México, 256.