Course guide
2500209 - GECGEOEDAF - Geology and Edaphology

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering,
745 - DEAB - Department of Agri-Food Engineering and Biotechnology.
Degree: BACHELOR’S DEGREE IN ENVIRONMENTAL ENGINEERING (Syllabus 2020). (Compulsory subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: Catalan

LECTORER
Coordinating lecturer: JOSEP SALVADOR BLANCH ROURE, JOSEP MARIA SALVANY DURAN
Others: JOSEP SALVADOR BLANCH ROURE, JOSE MOYA SANCHEZ, JOSEP MARIA SALVANY DURAN,
DANIEL TARRAGÓ MUNTÉ

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES
Specific:
14446. Solve mathematical problems that may arise in engineering by applying knowledge about: linear algebra, geometry,
differential geometry, differential and integral calculus, optimization, ordinary differential equations.
14447. Obtain basic knowledge about the use and programming of computers, operating systems, databases and basic numerical
calculation and applied to engineering.
14448. Manage the basic concepts about the general laws of mechanics and thermodynamics, concept of field and heat transfer, and
apply them to solve engineering problems.
14449. Apply the basic principles of general chemistry, organic and inorganic chemistry and their applications in engineering.
14450. Describe the global functioning of the planet: atmosphere, hydrosphere, lithosphere, biosphere, anthroposphere,
biogeochemical cycles (C, N, P, S), soil morphology and apply it to problems related to geology, geotechnics, edaphology and
climatology.

Generical:
14440. Identify, formulate and solve problems related to environmental engineering.
14441. Apply the functions of consulting, analysis, design, calculation, project, construction, maintenance, conservation and
exploitation of any action in the territory in the field of environmental engineering.
14444. Apply business management techniques and labor legislation.

TEACHING METHODOLOGY
The course consists of 2 hours per week of classroom activity (large size group) and 1 hour weekly with half the students (medium
size group).

The 2 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of
the subject, shows examples and solves exercises.

The 1 hour in the medium size groups is devoted to solving practical problems with greater interaction with the students. The
objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning
and assessment activities conducted and literature.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be
held in other languages.
LEARNING OBJECTIVES OF THE SUBJECT

Environmental engineering problems are very often located in a geological framework and in contact with the fluid layers of the Earth, where edaphic soils are formed. The products of geological activity (geological materials -minerals, rocks and soils-, geological structures and landforms) and the most important geological processes (magmatism, tectonics, erosion-sedimentation) are studied, including those that are potentially dangerous for the society. The objective of soil science is the edaphic soils, which form the skin of the earth’s crust and which are essential for life. This module studies the different characteristics of soils (mineralogy, chemistry, texture and structure, physical properties, biology and ecology), the typology of soils, their formation and evolution processes, and degradation problems.

1. Identify the different types of materials and geological structures, as well as infer some basic mechanical or hydraulic properties.
2. Interpret geological maps and make simple geological cuts from cartographic information.
3. Characterize active geological environments and identify the processes that occur in them, particularly dangerous ones.

Geology and Edaphology. Environmental engineering problems are very often located in a geological framework. Basic knowledge of geology (geological materials including edaphic soils, active erosive and sedimentary geological environments, and hazardous geological processes), and soil science and methods for application to environmental engineering problems are provided.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
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Total learning time: 150 h

CONTENTS

**Topic 1 - Introduction to the geology**

*Description:*

*Full-or-part-time: 4h 48m*

Theory classes: 2h
Self study : 2h 48m

**Topic 2 - Minerals**

*Description:*

*Full-or-part-time: 4h 48m*

Theory classes: 2h
Self study : 2h 48m
**Topic 3 - The igneous rocks**

**Description:**
1. Concepts of magma and igneous rock
2. Forms of location of igneous rocks
   - Intrusive rocks: plutonic and filonian
   - Extrusive or volcanic rocks: lavas and pyroclasts
3. Textures and mineral composition
4. Classification

R1 - Practice of intrusive igneous rocks
R2 - Practice of extrusive igneous rocks

**Full-or-part-time:** 9h 36m
- Theory classes: 2h
- Laboratory classes: 2h
- Self study: 5h 36m

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**Topic 4 - The superficial deposits**

**Description:**
1. Concept of residual surface formation
2. The external geological cycle
3. Physical weathering
4. Chemical weathering

1. Concept of sedimentary surface formation
2. Erosion, transport and sedimentation
3. Detrital, chemical and organogenic formations

**Full-or-part-time:** 9h 36m
- Theory classes: 4h
- Self study: 5h 36m

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**Topic 5 - The sedimentary rocks**

**Description:**
1. Sediment lithification
2. Detrital rocks
3. Evaporitic rocks
4. Carbonated rocks

R3 - Practice of detrital rocks
R4 - Practice of carbonated and evaporitic rocks

**Full-or-part-time:** 9h 36m
- Theory classes: 2h
- Laboratory classes: 2h
- Self study: 5h 36m

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**Topic 6 - Metamorphic rocks**

**Description:**
1. Concept of metamorphism and metamorphic rock
2. Types of metamorphisms
3. Texture and mineral composition
4. Classification

R5 - Practice of metamorphic rocks

**Full-or-part-time:** 7h 11m
- Theory classes: 2h
- Laboratory classes: 1h
- Self study: 4h 11m
### Topic 7 - The structural geology

**Description:**
1. Causes of the deformation of geological materials
2. Folds
3. Fractures: faults and diapiris

<table>
<thead>
<tr>
<th>M1</th>
<th>The topographic map</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2</td>
<td>Maps with monoclinals</td>
</tr>
<tr>
<td>M3</td>
<td>Maps with discrepancies</td>
</tr>
<tr>
<td>M4</td>
<td>Maps with faults</td>
</tr>
<tr>
<td>M5</td>
<td>Maps with folds</td>
</tr>
</tbody>
</table>

**Full-or-part-time:** 28h 47m  
Theory classes: 2h  
Practical classes: 10h  
Self study: 16h 47m

### First partial exam

**Full-or-part-time:** 4h 48m  
Laboratory classes: 2h  
Self study: 2h 48m

### Topic 8 - Introduction to soil science

**Description:**
1. Components and organization of soils
2. Soil formation: soil phases, solid phase, liquid phase
3. Gas phase
4. Soil as a natural system: functions

**Full-or-part-time:** 7h 11m  
Theory classes: 3h  
Self study: 4h 11m

### Topic 9 - The soil morphology

**Description:**
1. The horizons
2. Observable attributes
3. Granulometry and texture
4. Real and apparent density
5. Porosity

| E1 | Granulometry, texture and porosity |

**Full-or-part-time:** 12h  
Theory classes: 3h  
Practical classes: 2h  
Self study: 7h

### Topic 10 - The organic matter and biologic activity in the soil

**Description:**
1. Soil as a reservoir of C
2. Decomposition, mineralization and humification
3. Organic matter as a component of an ecosystem

| E2 | Organic matter and determination of water content |

**Full-or-part-time:** 12h  
Theory classes: 3h  
Practical classes: 2h  
Self study: 7h
Item 11 - Water in the soil

Description:

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study: 4h 11m

Theme 12 - The chemical properties of the soil

Description:
E3 - Complex of change, salinity and sodicity

Full-or-part-time: 9h 36m
Theory classes: 2h
Practical classes: 2h
Self study: 5h 36m

Item 13 - The problems of soil degradation

Description:
1. Physical degradation 2. Chemical degradation 3. Biological degradation

Full-or-part-time: 9h 36m
Theory classes: 4h
Self study: 5h 36m

Second partial examination

Full-or-part-time: 7h 11m
Laboratory classes: 3h
Self study: 4h 11m

GRADING SYSTEM

The qualification of the subject is obtained from the qualifications of the partial exams, the practices and the exercises. There will be two partial exams that are 30% of the qualification each one. Practices are 20% and exercises the remaining 20%.
It will be necessary to obtain a minimum qualification of 4,5 in the partial exams in order for the exercises and practices to average. In case of not reaching this minimum qualification the exams will have a value of 50% each one.
To pass the subject you must obtain a minimum qualification of 5 from the percentages indicated.
In case of failure, you can opt for a re-evaluation exam which in any case will include the entire subject. Only those who have taken all the evaluation tests during the semester will be eligible. The qualification in this re-evaluation exam will be of apt or not apt. In the first case the final grade will be a 5. In the second case the final grade will be the same as the previous final evaluation.
The partial exams will be face-to-face, each with a theory part and a practical part, of equal value (50% each part) in the exam mark.
BIBLIOGRAPHY

**Basic:**