250207 - GEOAPLI - Applied Geology

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering
Academic year: 2018
Degree: BACHELOR’S DEGREE IN PUBLIC WORKS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan

Teaching staff
Coordinator: JOSEP MARIA SALVANY DURAN
Others: JOSEP MARIA SALVANY DURAN, DANIEL TARRAGÓ MUNTÉ

Opening hours
Timetable: Upon agreement with each subject teacher

Degree competences to which the subject contributes

Specific:
3100. Basic knowledge of geology and terrain morphology and their application to engineering problems. Climatology

Transversal:
591. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
597. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
600. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

Teaching methodology

The course consists of 2 hours per week of theory classes and 2 hours weekly of practice classes.

In the theory classes, the basic concepts of the matter will be exposed by the teacher

In the practice classes, the teacher will propose problems and exercises which will be solved by the students with the purpose to consolidate the learning objectives

Learning objectives of the subject

Students will acquire a basic understanding of geology, morphology and climatology and learn how these disciplines apply to engineering problems.

On completion of the course, students will have acquired the ability to:
1. Identify specific types of rock and infer their basic mechanical and hydraulic properties;
2. Identify terrain structures and infer some of the basic structural, mechanical and hydrological properties of rocks;
3. Interpret geological maps and construct geological cross-sections using cartographic information and the results of reconnaissance surveys.
Mineralogy and its role in the composition of rocks; Types of naturally occurring rocks: igneous, sedimentary and metamorphic; Structural geology, including faults and joints and basic concepts of plate tectonics; Basic seismology; Geomorphology, in particular its bearing on engineering

### Study load

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Total learning time</strong></td>
<td>150h</td>
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</tr>
<tr>
<td>Theory classes:</td>
<td>32h</td>
<td>21.33%</td>
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<tr>
<td>Practical classes:</td>
<td>14h</td>
<td>9.33%</td>
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<tr>
<td>Laboratory classes:</td>
<td>14h</td>
<td>9.33%</td>
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<tr>
<td>Guided activities:</td>
<td>6h</td>
<td>4.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>84h</td>
<td>56.00%</td>
</tr>
</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Item 01. Earth structure and plate tectonics</th>
<th>Learning time: 9h 36m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study: 5h 36m</td>
</tr>
</tbody>
</table>

**Description:**
The Earth structure  
Plate tectonics

**Specific objectives:**
Know the Earth's interior. The main beds derived from their chemical composition and physical state.  
Know the basic terminology and concepts about the Earth dynamics on a global scale.

<table>
<thead>
<tr>
<th>Item 02. Mineralogy</th>
<th>Learning time: 4h 48m</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study: 2h 48m</td>
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</tbody>
</table>

**Description:**
The minerals

**Specific objectives:**
Know the concept of mineral and its main chemical and mechanical properties. Know the main rock-forming minerals.

<table>
<thead>
<tr>
<th>Item 03. Igneous rock</th>
<th>Learning time: 14h 23m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study: 8h 23m</td>
</tr>
</tbody>
</table>

**Description:**
The igneous rocks  
Intrusive rocks  
Extrusive (volcanic) rocks

**Specific objectives:**
Know the basic terminology and concepts about the origin of igneous rocks, different types of igneous rocks and their classification.  
Learn to describe and identify intrusive igneous rocks  
Learn to describe and identify extrusive (volcanic) rocks
### Item 04. Soils and sediments

**Learning time:** 9h 36m  
- Theory classes: 4h  
- Self study: 5h 36m

**Description:**  
The external geological cycle: weathering, residual soils and sediments

**Specific objectives:**  
Know the basic concepts and terminology on the external geological cycle, residual soils and sediments

### Item 05. Sedimentary Rocks

**Learning time:** 19h 12m  
- Theory classes: 4h  
- Laboratory classes: 4h  
- Self study: 11h 12m

**Description:**  
The sedimentary detrital rocks  
The carbonate and evaporitic sedimentary rocks  
Detrital sedimentary rocks  
The evaporitic and carbonate sedimentary rocks

**Specific objectives:**  
Know the basic concepts and terminology about the origin of detrital rocks, different types and their classification  
Introduction to the basic concepts and terminology about the origin of the carbonate and evaporitic rocks, different types and its classification  
Learn to describe and identify detrital sedimentary rocks  
Learn to describe and identify evaporitic and carbonate sedimentary rocks

### Item 06. Metamorphic Rocks

**Learning time:** 9h 36m  
- Theory classes: 2h  
- Laboratory classes: 2h  
- Self study: 5h 36m

**Description:**  
The metamorphic rocks  
Metamorphic rocks

**Specific objectives:**  
Introduction to the basic concepts and terminology about the origin of the metamorphic rocks, different types and its classification  
Learn to describe and identify metamorphic rocks
<table>
<thead>
<tr>
<th>Review of rocks</th>
<th>Learning time: 4h 48m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td>Review of rocks</td>
<td>Self study: 2h 48m</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
</tr>
<tr>
<td>Evaluation of the knowledge acquired during the practical recognition of rocks R 1, R-2, R 3 and R-4</td>
<td></td>
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</tbody>
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<thead>
<tr>
<th>Item 07. Structural geology</th>
<th>Learning time: 28h 47m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td>Structural geology</td>
<td>Practical classes: 10h</td>
</tr>
<tr>
<td>Topographic maps and geological surfaces</td>
<td>Self study: 16h 47m</td>
</tr>
<tr>
<td>Unconformities</td>
<td></td>
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<tr>
<td>Faults</td>
<td></td>
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<tr>
<td>Folds</td>
<td></td>
</tr>
<tr>
<td>Practice geological maps with folds</td>
<td></td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
</tr>
<tr>
<td>Concepts folds, faults and joints</td>
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<tr>
<td>Learn to draw topographic profiles and cartographic representation of geological surfaces.</td>
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<tr>
<td>Learn to interpret unconformity-bearing geological maps</td>
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<tr>
<td>Learn to interpret fault-bearing geological maps</td>
<td></td>
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<tr>
<td>Learn to interpret fold-bearing geological maps</td>
<td></td>
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<tr>
<td>Learn to interpret geological maps with folds</td>
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</table>

<table>
<thead>
<tr>
<th>Review of maps</th>
<th>Learning time: 4h 48m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td>Review of maps</td>
<td>Self study: 2h 48m</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td></td>
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</table>
### 1st part of theory exam

**Description:**
1st partial theory

**Specific objectives:**
Evaluation of the knowledge acquired in the first six issues of theory (basic geology)

**Learning time:** 2h 24m
- Theory classes: 1h
- Self study: 1h 24m

### Item 08. Geological Survey appl. to the construction

**Description:**
Geological and geotechnical studies for preliminary projects and construction projects of public works

**Learning time:** 4h 48m
- Theory classes: 2h
- Self study: 2h 48m

### Item 09. Procedures and tests

**Description:**
Procedures and tests to make geological studies

**Learning time:** 4h 48m
- Theory classes: 2h
- Self study: 2h 48m

### Item 10: The rocky massif

**Description:**
Characteristics of the rocky massif

**Learning time:** 4h 48m
- Theory classes: 2h
- Self study: 2h 48m

### Item 11: Properties of rocks

**Description:**
Properties of rocks

**Learning time:** 4h 48m
- Theory classes: 2h
- Self study: 2h 48m
### Item 12. Discontinuities

**Learning time:** 4h 48m  
- Theory classes: 2h  
- Self study: 2h 48m  

**Description:**  
Discontinuity planes. Importance in tunnel construction

### Item 13. Standings geomecàniques

**Learning time:** 4h 48m  
- Theory classes: 2h  
- Self study: 2h 48m

**Description:**  
Geomechanic classifications

### Item 14. Soils

**Learning time:** 4h 48m  
- Theory classes: 2h  
- Self study: 2h 48m  

**Description:**  
Soils. Properties, recognition and studies

### 2nd part of theory exam

**Learning time:** 2h 24m  
- Theory classes: 1h  
- Self study: 1h 24m  

**Description:**  
2nd partial theory  
**Specific objectives:**  
Evaluation of the knowledge acquired in the 8 to 14 issues of theory, of applied geology.
Qualification system

The final evaluation (ordinary evaluation) is the sum of the following partial marks:

1/3 mark of practical exercises made in classes of theory and practices

1/3 mark of the first exam, including the first set of theory themes and the practices of identification of rocks

1/3 mark of the second exam, including the second set of theory themes and the practices of interpretation of geological maps

Criteria for re-evaluation qualification and eligibility: Students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

This re-evaluation must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

Regulations for carrying out activities

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

In the case of repeating one or more partials, the last grade, be it higher or lower, is the one that will be valid in the final grade.

Bibliography

Basic:


