

## 60430 - Methods and techniques in Geology

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	100 - Facultad de Ciencias
<b>Degree</b>	541 - Master's in Geology: Techniques and Applications
<b>ECTS</b>	12.0
<b>Course</b>	1
<b>Period</b>	First semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **1.Basic info**

#### **1.1.Recommendations to take this course**

#### **1.2.Activities and key dates for the course**

### **2.Initiation**

#### **2.1.Learning outcomes that define the subject**

#### **2.2.Introduction**

### **3.Context and competences**

#### **3.1.Goals**

#### **3.2.Context and meaning of the subject in the degree**

#### **3.3.Competences**

#### **3.4.Importance of learning outcomes**

### **4.Evaluation**

### **5.Activities and resources**

#### **5.1.General methodological presentation**

This course is intended for students to acquire advanced training in various methods and techniques of Geology, both for basic and applied research, and the application of this knowledge to the design of geological survey campaigns.

This course is aimed primarily at students with a background in Geology, but it is also appropriate for students trained in other disciplines (Engineering geology or mining, Biology, Physics, Environmental Science, Geography, ...) that require knowledge of the most commonly used methods in various fields of Geology.

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The course uses the following teaching methods:

1. Lectures (6.1 ECTS: 61 hours of classroom teaching).
2. Practical sessions (5.1 ECTS: 51 hours of classroom teaching).
3. Field sessions (0,8 ECTS: 8 hours of field work).

### 5.2.Learning activities

The course has a similar number of teaching hours allocated to lectures and practical sessions. Several learning activities have been designed in order to achieve the academic goals:

1. Lectures: these are lectures where the fundamentals of the topics covered during the course are explained using ICTs, engaging the student in active participation.
2. Problem solving sessions: practical sessions where real-world problems are formulated and solved by means of general purpose or dedicated software.
3. Laboratory practicals. Practical sessions carried out in the laboratory using specific methodologies, techniques and instruments.
4. Seminars. Discussion and debate on specific topics or case studies based on work done by students.
5. Field sessions. Two one-day field trips to put into practice geological prospecting techniques and to gather data to be used in practical sessions in the lab.

In order to optimize coordination between lectures and practicals, the course is taught in intensive five-hour sessions combining participative lectures, problem solving tasks and computer-based case studies.

### 5.3.Program

#### UNIT 1: Instrumental techniques: requirements and applications

- 1.1- Determination of physical and mechanical properties: Porosity, permeability, density; Thermal properties; Magnetic properties; Most relevant geotechnical and geomechanical
- 1.2- Introduction to mineral and chemical characterization techniques: Mineral-chemical characterization; Chemical characterization techniques; Isotopic techniques; Other techniques: ATD / ATG, infrared spectrometry

#### UNIT 2: Dating of geological materials

- 2.1- Radioisotope techniques
- 2.2- Techniques in recent materials

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2.3.-Thermochronology

2.4- Cyclostratigraphy

2.5- Geochronological applications of paleomagnetism

2.6- Biochronological methods

2.7.-Chronostratigraphy and Geochronology

### **UNIT 3: Campaign design exploration and geological prospecting**

3.1- Design of a campaign of prospecting and paleontological dig

3.2- Design of a campaign of prospecting mineralogy-petrology

3.3- Design of a campaign to basin analysis

3.4- Design of a research cruise in structural geology and geophysical prospecting

3.5- Design of a campaign-geomorphological hydrogeological survey

### **Practical sessions:**

#### **Unit 1:**

Session 1- Determination of petrophysical properties: density, porosity, permeability (6 hours)

Session 2- Magnetism o rocks practice techniques (3h)

Session 3- Planning a sampling campaign based on objectives. Choice test (2h)

Interpretation of logs 4- dynamic penetration, correlation with SPT and applications (2h)

#### **Unit 2:**

Session 5- Dating series with sedimentary cyclicity (4h)

Session 6- Magnetostratigraphy practice session (4h)

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Session 7- Application of qualitative techniques of construction and calibration of biochronological scales (2h)

Session 8- Exercises of quantitative and statistical biostratigraphy (2h)

### Unit 3:

Session 9.- Design of a paleontological campaign: prospecting and excavation (5h)

Session 10- Design of a petrology - mineralogy campaign (5h)

Session 11- Design of a campaign for basin analysis (5h)

Session 12.- Design of a research campaign in structural geology and a geophysical survey (5h)

Session 13.- Design of a geomorphological and hydrogeological survey (5h)

Session 14.- Fieldwork (8 hours)

### 5.4.Planning and scheduling

- The course is taught in five-hour sessions (Tue and Thu, from 4 pm to 9 pm) that combine lecture time and practicals.

- At the beginning of the course, during the first sessions, a calendar with all planned activities will be handed out. This calendar will include the deadlines for submission of each piece of assessment.

- The field sessions will be scheduled and announced in due time.

### 5.5.Bibliography and recommended resources

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