

## **COURSE INFORMATION**

### **EARTH SCIENCES**

Code number: 606510107

Degree: Forestry and Environment Engineering.

Department: Agroforestry Sciences

Academic Year: 2017-2018

Foundational course. 1<sup>st</sup> year. Second semester

Timetable:

- Theory: 1.5 hours per session, 2 sessions per week, 12 weeks.
- Practical: 2 hours per session, 1 session per week, 10 weeks

Credit value: 6 ECTS

Link to Spanish counterpart: <http://www.uhu.es/etsi/guia-de-asignatura/?codigo=606510107>

## **TEACHING STAFF**

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Office hours:

First Semester: To be determined

Second Semester: To be determined

## **PROGRAMME**

### **1. DESCRIPTION**

This course aims to provide students with an introduction to Earth Sciences, with particular focus on the following areas: applied meteorology and climatology, the Earth and its components; Earth dynamics; geomorphology and external geological processes; minerals and rocks important for soils;; applied soils.

### **2. PREREQUISITES**

There are no specific prerequisites, but it is highly recommended that students have a background in technical or science subjects at pre-university level.

### **3. OBJECTIVES AND LEARNING OUTCOMES**

The general objective is that students acquire the basic knowledge of the physical environment that they will be required to apply during their degree course and in their professional development.

The specific objectives are:

- To learn the elements, factors and processes that drive the functioning of the earth system.
- To learn the soil and climate classifications that are most commonly used at national and international level

- To make students aware of the utility and applicability of the knowledge they acquire about the earth system with regard to the professional skills required by forest and environmental engineers, and to other subjects forming part of the degree.

On successful completion of the course students should be able to:

- demonstrate understanding of the Earth's composition and geomorphology
- explain the elements of the Earth system, their connections and functioning as a system.
- describe and analyze the role of the different atmospheric gases on the climate.
- describe and discuss the climatic elements as an expression of the processes that occur in the low atmosphere layers.
- give an account of the general distribution of the climates on earth and the main climatic classifications at national and world levels.
- acquire and manage climatic information to classify and characterize the climate of a region.
- define the concept of soil and to relate the soil with the possibility of development of different flora species and with environmental activities.
- describe the soil components and their influence in the physical, chemical and biological characteristics of soils
- describe the factors of soil development and to point out the relationship between the spatial variations of the factors of soil formation and the soil characteristics and development
- explain the processes of soil formation
- give an account of the different systems of soil classification and classify a soil with real data.

#### **4. COMPETENCES**

B06, C03, G01, G05, G11, G16, T01, T02

#### **5. TEACHING METHODOLOGY**

##### 1. Theory classes

There will be 32 hours of lessons in which the theoretical base of the subject will be explained, with the aid of boardwork and computer presentations. Participation of the students is highly encouraged and will form part of the evaluation.

##### 2. Practical lessons in the laboratory

There will be 10 two-hour sessions in the laboratory. These practical lessons will consist in practising recognising the main minerals and rocks, and solving practical tasks.

##### 3. Work in groups

There will be two tasks for students to carry out in small groups:

- Oral exposition

During the course the students will be required to prepare a written presentation on a topic of their choice related to either the practical or theoretical part of the subject. The choice of topics will be provided by the teacher at the beginning of the course. The students will have to manage a range of bibliographic sources, will prepare a written document and will give an oral presentation of the work at the end of the course.

- Practical work

For the practical section of this course, the students will be required to characterize the climate of a specific area based on climatic information that they have gathered and managed. The teacher will provide a list of areas from which to choose at the beginning of the course.

#### 4. Field training

There will be a field trip (1 day) in the province of Huelva in which a soil sampling procedure will be followed

### **6. CONTENTS THEORY**

#### *Part I. Climatology*

##### UNIT 1 : CLIMATOLOGY: CONCEPTS AND ENVIRONMENTAL PROJECTION.

1.1. Concepts and definitions. 1.2. Historical introduction. 1.3. Importance for the development of plants. 1.4.- Climatology in environmental sciences

##### UNIT 2: THE EARTH'S CLIMATIC SYSTEM.

2.1. Definition of the Earth's climatic system. 2.2. Elements of the Earth's climatic system. 2.3. Variability and changes in the Earth's climatic system.

##### UNIT 3: ELEMENTS OF CLIMATE.

3.1. Energy (light and temperature). 3.2. Water. 3.3. Atmospheric pressure. 3.4. Wind.

##### UNIT 4: ATMOSPHERIC DYNAMICS.

4.1. Air masses. Definition and classification. 4.2. Air masses movement. 4.3. General atmospheric circulation. 4.4. Local winds.

##### UNIT 5: THE EARTH'S CLIMATES. CLIMATIC CLASSIFICATIONS.

5.1. Climatic classifications and vegetation zones. 5.2. Austin-Miller classification. 5.3. Walter classification. 5.4. Climate in Spain. 5.5. Spanish classifications of interest to environment studies

#### *Part II: Geology*

##### UNIT 6: GEOLOGY: CONCEPTS AND ENVIRONMENTAL PROJECTION

6.1. Concepts and definitions. 6.2. Historical introduction.. 6.3. The Earth's system. 6.4. Geology and environmental projection

##### UNIT 7: THE EARTH AND ITS COMPONENTS

7.1. The Earth in the universe and the Solar System. 7.2. Structure and composition. 7.3. Tectonic plates movement. 7.4. Geological scale

##### UNIT 8: INTERNAL GEOLOGICAL PROCESSES

8.1. Magmatism. 8.2. Metamorphism. 8.3. Tectonics

##### UNIT 9: EXTERNAL GEOLOGICAL PROCESSES.

9.1.- Geomorphology and external geological processes. 9.2. Weathering. 9.3. Erosion and Transport. 9.4. Sedimentation and sedimentary rocks

#### *Part III. Soils*

##### UNIT 10: SOIL SCIENCE: CONCEPTS AND ENVIRONMENTAL PROJECTION.

10.1. Concepts of soil, edaphology and pedology. 10.2. Historical introduction. 10.3.- Profile and horizons. 10.4. Dynamics and evolution of soils. 10.5. Importance for plant developments. 10.6. Soil science and environmental projection

##### UNIT 11: SOIL COMPONENTS.

11.1.Introduction. 11.2.Mineral fraction. 11.3.Organic matter. 11.4.Organic-minerals complex.11.5.Soil color. 11.6.Air. 11.7.Water. 11.8. Soil solution.

#### UNIT 12: FACTORS OF SOIL FORMATION.

12.1. Introduction. 12.2. Climate. 12.3. Organisms. 12.4. Humans. 12.5. Parent material. 12.6. Relief. 12.7. Vegetation. 12.8. Time

#### UNIT 13: PROCESSES OF SOIL FORMATION.

13.1. Introduction. 13.2. Preliminary note: climatic classification according to mean temperatures. 13.3. Calcimorfization. 13.4.Braunification. 13.5. Levigation. 13.6. Podzolization. 13.7. Fersiallitization. 13.8. Ferrallitization. 13.9. Tirsification. 13.10.Salinization. 13.11. Solodization. 13.12. Mottling

#### UNIT 14.- SOIL HORIZONS DESIGNATION AND FAO SOIL CLASSIFICATION

14.1. Soil horizon designation. 14.2. Introduction to FAO soil classification. 14.3. Principles of soil classification according to the FAO World Reference Base (WRB)

### **PRACTICAL PROGRAM**

1. Criteria for choosing a weather station, calculation of mean values and climate diagrams. Explanation of practical work of climate characterization
2. Reference Evapotranspiration and water balance in soils.
3. Minerals and rocks important for soil formation (I)
4. Mineral and rocks important for soil formation (II)
5. Air mass movement
6. Climatic classifications
7. Granulometric curve in soils
8. Permeability and water retention capacity in soils
9. Soil identification and classification (I)
10. Soil identification and classification (II)

### **7. BIBLIOGRAPHY**

#### **Part I. Climatology**

AHRENS, C.D. 2001. Essentials of meteorology. An invitation to the atmosphere. Ed. Brooks/Cole. 3rd. Edition. USA.

FAO (2006). Crop Evapotranspiration (guidelines for computing crop water requirements) FAO Irrigation and Drainage Paper No. 56. Rome, Italy.

ROHLI, R.V., VEGA, A.J., 2013. Climatology. 3rd. Edition. Jones & Bartlett Learning.

STRAHLER, A., 2013. Introducing Physical Geography, 6th Edition. Jon Wiley & Sons, USA.

#### **Part II: Geology**

STRAHLER, A. 1981. Physical geology. Harper & Row.. 612 pp.

TARBUCK, E.J, LUTGENS, F.K. 2014. Earth Sciences. 14<sup>th</sup> Edition. Prentice Hall.

WICANDER R., MONROE, J.S. 2005. Essentials of physical geology. 5th. Edition. Thomson Brooks/Cole.

### **Part III: Soils**

BRIDGES, E.M., 1997. World soils. 3rd edition. Cambridge University Press. UK.

FAO, 2006. Guidelines for soil description. FAO, Rome.

FISHER, R.F. Y BINKLEY, D. 2000. Ecology and management of forest soils. 3rd edition. John Wiley & Sons, USA. 489 pp.

SOIL SURVEY STAFF, 1999. Soil Taxonomy. A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Agricultural Handbook 436, Natural Resources Conservation Service, USDA, Washington DC, USA, 869 pp.

WRB. 2015. World Reference Base for Soil Resources 2014. International soil classification system for naming soils and creating legends for soil maps. Update 2015. World Soil Resources Reports No. 106. FAO, Rome.

## **8. ASSESSMENT**

### **Theory and practical written assessment**

This exam represents 70% of the final mark. To pass the subject it is necessary to obtain at least 4 out of 10 in this exam.

### **Identification of minerals and rocks assessment**

This exam consists in correctly identifying minerals and rocks that have been studied in practical lessons 3 and 4. The grade in this exam is: pass/fail.

### **Work for oral exposition**

The mark for this task represents 15% of the final mark. The mark is from 0 to 10 and to pass the subject it is necessary to obtain at least 4 points. The evaluation of this task takes into account the quality of the written work and the oral exposition.

### **Practical work**

The mark for this work represents 15% of the final mark. The mark is from 0 to 10 and to pass the subject it is necessary to obtain at least 4 points

### **Participation and interest**

The active participation and interest in the subject demonstrated by students will be evaluated, adding up to 1 point to the final mark.

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### **Final mark**

The final mark for the subject will be obtained thus:  $0.7 \times A + 0.15 \times B + 0.15 \times C + D$ , where A is the mark for the theory-practical written exam. B is the mark for the oral exposition task. C: is the mark for the practical work and D is the teacher's evaluation of the interest and active participation of the student.

To pass the subject, students have to obtain at least 5 points in the final mark, with at least 4 points in the grades for A, B and C and a "pass" in the assessment of identification of minerals and rocks.

'Final results will be given in terms of a numerical scale between 0 and 10 (including tenths), with the corresponding qualitative ratings below:

- $\leq 4.9$ : Fail (D)

- 5.0 - 6.9: Pass (C)
- 7.0 - 8.9: Pass with Merit (B)
- 9.0 - 10: Distinction (A)

The total number of distinctions cannot exceed 5% of the students enrolled in the subject in the academic year (unless the number of students enrolled is lower to 20, in which case one distinction can be awarded)

The grading system is subject to the Bachelor's Degree Exam Regulations of the University of Huelva (Normativa de Evaluación para las Titulaciones de Grado de la Universidad de Huelva). Please refer to:

<[http://www.uhu.es/sec.general/Normativa/Texto\\_Normativa/Normativa\\_de\\_Evaluacion\\_grados.pdf](http://www.uhu.es/sec.general/Normativa/Texto_Normativa/Normativa_de_Evaluacion_grados.pdf)>.

In particular, please note that make-up exams and other special circumstances will be subject to article 19 of these regulations.