

26424 - Environmental Geology

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	6.0
Year	4
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The course has been designed to provide students with the necessary link between the theoretical knowledge and its practical use in the resolution of problems related with the Environmental Geology field.

The student will develop competences in the prevention, analysis and correction of interactions between human activities

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and natural systems, in terms of natural and cultural resources, environmental impacts (including impacts on geological heritage), geological hazards and environmental land use planning and management.

5.2.Learning tasks

Activity 1: Lectures (3.0 ECTS). To develop the concepts and theoretical basis of the course. The course consists of three parts: Part I (Introduction), Part II (Resources: effects of human activities and its evaluation) and Part III (Environmental land-use planning and management).

Activity 2: Practical Sessions (3.0 ECTS). Apply various laboratory and field work techniques for the environmental land use planning and management and for evaluating impacts of human activities.

This course consists of three 55-minute lectures and one 2-hours lab session per week. Two all-day field trips are also scheduled in this course.

5.3.Syllabus

Part I. Introduction

Lectures

- Introduction to Environmental Geology: concept and work lines.

Part II. Resources: effects of human activities and its evaluation

Lectures

- Water resources: development and exploitation. Pollution. Types of pollutants and toxicity. Point source pollution and non-point source pollution. Dispersion of pollutants in waters.
- Soil resources: human activities and soil degradation. Desertification, salinization. Soil pollution. Some basic concepts: vulnerability, buffer capacity, critical load, bioavailability. Main pollutants. Mitigation.
- Energy Resources: potential utilization risks. Fossil fuels, nuclear power, wind energy, hydraulic energy, tidal or wavy energy, geothermal energy, biomass.
- Mineral resources: environmental impact of the mining activity on the hydrosphere, atmosphere and soils. AMD prediction. Prevention and Treatment.
- The heritage as a resource. Conservation of natural and cultural heritage sites. Management and uses. Geodiversity

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and paleontological sites: typology, valuation and heritage evaluation. Guidelines for heritage impacts assesment.

- Fauna and flora. Use of paleontological databases and techniques in environmental analysis. Applications in biodiversity analysis and conservation policies. Analysis of recent ecosystem evolution. Biodiversity response to climate changes.

Laboratory practicals

- Water balance calculations: the Aral Sea case.
- Assessing of water quality for irrigation.
- Acid drainage prediction in mine sites.
- Identification of secondary minerals formed in AMD settings by means of X-ray powder-diffraction.
- Heritage impacts assesment.
- Use of paleontological techniques in environmental analysis.

Part III. Environmental land-use planning and management

Lectures

- Definition and objectives of environmental land use planning: the role of Geology.
- Guidelines for spatial planning and land management at regional level.
- Stages in an environmental land use planning process.
- Environmental maps: synthetic and analytic mapping techniques.
- Geoenvironmental homogeneous units: definition and mapping.
- Natural and geological hazards as limiting factors in the land use planning: classification and mapping. Mass movements, aquifer vulnerability, flooding, subsidence, soil erosion, seismic activity and volcanic processes.
- Environmental quality (vegetation cover, fauna, geological heritage and landscape) for spatial preservation: techniques and mapping.
- Oriented land use planning: capacity of morphodynamic homogeneous units.

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Laboratory practicals

- Production of geoenvironmental maps of interest in the design of environmental land use planning and management: descriptive (homogeneous land units), interpretative (geological hazards and quality conservation) and indicative (orientation and restriction) maps.

Part IV. Field work (2 days)

- Local field case studies of interactions between human activities and geological systems: impacts, geological hazards and environmental land use planning and management.

5.4.Course planning and calendar

- Total Number of Hours of Student Work: 150
- Hour of Lectures: 30
- Hours of Practical Classes: 22
- Days of Fieldwork: 2

5.5.Bibliography and recommended resources

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|-----------|---|
| BB | Andrews, J.E.. An introduction to environmental chemistry. 2nd ed. Blackwell Publishing. 2003 |
| BB | Ayala, F.J, y Jorda, J.F.. Geología Ambiental. Instituto Geológico y Minero. 1988 |
| BB | Canter, Larry W.. Manual de evaluación de impacto ambiental : técnicas para la elaboración de estudios de impacto / Larry W. Canter ; traducción, Ignacio Español Echániz...[et al.] ; revisión técnica, José Vicente López Alvarez, José María Casillas Barral, Rosa María Gómez Alonso . - 1a ed. en español Madrid [etc.] : McGraw-Hill, D.L. 1997 |
| BB | Carcavilla, L.. Patrimonio geológico y geodiversidad: investigación, conservación, gestión y relación con los espacios naturales protegidos Instituto Geológico y Minero de España. 2007 |
| BB | Deutsch, William J.. Groundwater geochemistry : fundamentals and applications to contamination / William J. Deutsch. Boca Raton : Lewis Publishers , cop. 1997. |
| BB | Environmental micropaleontology : the application of microfossils to environmental geology / edited by Ronald E. Martin |

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Dordrecht [etc.] : Kluwer Academic Publishers, 2000

BB Evaluación de impacto ambiental / Alfonso Garmendia Salvador...[et al.] Madrid [etc.] : Pearson/Prentice Hall, cop. 2005.

BB Geología y medio ambiente / [colaboradores, Álvarez Ramis , Concepción...(et al.) ; coordinador, Pedraza Gilsanz, Javier de] Madrid : [Ministerio de Obras Públicas y Urbanismo, Centro de Estudios de Ordenación del Territorio y Medio Ambiente], 1981

BB Geología y medio ambiente / [colaboradores, Álvarez Ramis , Concepción...(et al.) ; coordinador, Pedraza Gilsanz, Javier de] Madrid : [Ministerio de Obras Públicas y Urbanismo, Centro de Estudios de Ordenación del Territorio y Medio Ambiente], 1981

BB Geomorfología práctica : ejercicios de fotointerpretación y planificación geoambiental / Juan de Dios Centeno ... [et al.] Madrid : Rueda, D.L. 1994

BB Jambor, J.L.. Environmental aspects of mine wastes. Short Courses Series 31. Vancouver. British Columbia. 2003

BB Morales, J.. Patrimonio paleontológico de la Comunidad de Madrid. Arqueología, Paleontología y Etnografía nº6. Comunidad de Madrid. 2000

BB Riesgos geológicos : recoge las exposiciones del Cuadro de Profesores del I Curso de Riesgos Geológicos, celebrado en Madrid, en noviembre de 1987 . Madrid : Instituto Geológico y Minero de España, D.L. 1988

BB Valencia (Provincia). Diputación Provincial. Servicio de Recursos Geológicos. Mapa geocientífico de la provincia de Valencia escala 1: 200.000 [Material cartográfico] /

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[realizado... por el Servicio de Recursos Geológicos de la Excma. Diputación Provincial de Valencia ; dirección Cendrero Uceda, A.] 255 E. 1:200.000 ; proyec. U.T.M. (Huso 30) elipsoide internacional (O 1° 40' - E 0° 04' / N 40° 23' - S 38° 26')
Valencia : Diputación Provincial de Valencia, Servicio de Recursos Geológicos, 1986

LISTADO DE URLs:

Prediction Manual for Drainage Chemistry from Silphidic Geological Materials -
[http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5336546.pdf]

Course materials will consist of class notes, lecture notes (pdf files of lecture slides will be provided) and handouts.

Up-to-date bibliography and recommended readings for the course can be accessed through the website of the university library (<http://biblioteca.unizar.es/>).