

**COURSE DATA****Data Subject**

<b>Code</b>	41055
<b>Name</b>	Restoration of the environment and analysis of climatic alterations
<b>Cycle</b>	Master's degree
<b>ECTS Credits</b>	10.0
<b>Academic year</b>	2020 - 2021

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
2001 - Master's Degree in Environmental and Territorial Management Techniques	Faculty of Geography and History	1	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
2001 - Master's Degree in Environmental and Territorial Management Techniques	3 - Methods and techniques for the analysis of the physical environment	Optional

**Coordination**

<b>Name</b>	<b>Department</b>
SEGURA BELTRAN, FRANCISCA	195 - Geography

**SUMMARY**

In the last decades of greater technological predominance, an economic vision has predominated in the management of natural systems, which has prioritized the conception of nature as a resource, using them as a source of energy and matter (mountains, rivers) or valuing them as public space (beaches, rivers). This abusive use of natural systems has led to the alteration of practically the entire territory, leaving few wild spaces. However, the increasingly serious environmental problems are causing greater environmental awareness. That is why the administration promotes restoration actions of the various ecosystems. This course will analyze the most common alterations and restoration proposals that are being carried out - often experimentally - in different natural systems.

**ALTERATION AND RESTORATION OF NATURAL SYSTEMS**



The subject "Alteration and restoration of natural systems" is inserted in the module "Methods and techniques of analysis of the physical environment" of the Master Techniques for the Management of the Environment and Territory, with a total of 6 credits. It is a subject structured in three blocks, each of which will be taught by specialist teachers in the subject:

Block I: Alteration and restoration of river systems

Block II: Restoration of slopes and vegetation cover

Block III: Alteration and restoration of coastal means

### **ANALYSIS TECHNIQUES OF EXTREME HYDROMETEOROLOGICAL EVENTS**

The subject " Analysis techniques of extreme hydrometeorological events" is inserted in the module "Methods and techniques of analysis of the physical environment". Climate is a complex system of interrelationships between variables and processes. Control of this system is very difficult and it is true that anthropic action can modify, with partly unpredictable results. Due to the orientation of this itinerary, this course deals with the study of the sources of climate information with special emphasis on the analysis of statistical treatment techniques for the variables that comprise it. Special attention will be paid to the study of extremes, especially sensitive in the context of global change.

The reality of global warming does not admit big discussions today, in view of the abundant thermal records, both from conventional meteorological observatories and those derived from remote sensing, indirect data on the retreat of glaciers, etc. In fact, the fourth IPCC report (2007) calls it unequivocal. Therefore, on a warmer planet on the surface, one can expect an accentuation of two opposite pluviometric risks, but very common in the Valencian territory, torrential rainfall and droughts. Thus, in a territory where future scenarios indicate trends towards an increase in extreme events, a good knowledge of the analysis methods is required, especially considering the great variety of methods and techniques for analyzing climate risks. .

At the same time, the large number of sources of information, with very different characteristics from each other, is conditioning the type of analysis techniques the application of the most appropriate for each case.

Therefore, in order to provide a suitable selection for the Mediterranean environment of the main methods of analysis of extreme meteorological events, this course is divided into two blocks:

Block I: Selection, characterization and analysis of rain episodes. The episodes of extraordinary Mediterranean rains are analyzed and the selection criteria and the main statistical indicators are explained.

Block II: Analysis of extreme meteorological events and their relationship with sea temperature.

### **ANALYSIS TECHNIQUES OF CLIMATIC CHANGES**

The subject "Techniques of analysis of climatic alterations" is inserted in the module "Methods and techniques of analysis of the physical environment" of the Master Techniques for the Management of the Environment and Territory, with a total of 2 credits.



Climate is a complex system of interrelationships between variables and processes. Control of this system is very difficult and it is true that anthropic action can modify it, with partly unpredictable results. Due to the orientation of this itinerary, this course deals with the study of climate information sources with special emphasis on the analysis of statistical treatment techniques for the variables that comprise it. Special attention will be paid to the study of extremes, especially sensitive in the context of Global Change.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

None

## COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

### 2001 - Master's Degree in Environmental and Territorial Management Techniques

- Capacidad de organización, planificación y gestión de la información ambiental y territorial
- Técnicas de análisis cuantitativo
- Manejo de Sistemas de Información Geográfica aplicados a los problemas medioambientales y territoriales
- Técnicas de Teledetección espacial
- Análisis del medio físico de una manera integrada, interrelacionando sus componentes a partir del trabajo de campo y manejo de elementos cartográficos y toma de datos.
- Capacidad de analizar y caracterizar los procesos naturales y de degradación y evaluar las posibilidades de restauración medioambiental.
- Capacidad de analizar y caracterizar riesgos medioambientales, su prevención, predicción y gestión.
- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.



- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.

## **LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)**

Creation of environmental mapping with GIS

Management of topographic information and extraction of useful data for land and environmental management

Studies of environmental risks, prevention, prediction and management. Preparation of applied climate studies

Preparation of studies on the degradation of natural systems (rivers, coasts, slopes) and restoration proposals

## **DESCRIPTION OF CONTENTS**

### **1. Alteration and restauration of river systems**

Principles of river dynamics. Geomorphology: forms and processes in river beds. Anthropogenic changes in river systems (direct and indirect human actions). River restoration. Ecological regime of flows.

### **2. Restoration of slopes and vegetation cover**

Interactions between erosion and vegetation and its application to the restoration of natural slopes. Topographical, hydrological and ecological factors that determine degradation and vegetable colonisation thresholds. Effects of forest fires on the soil and vegetation.

### **3. Alteration and restoration of coastal environments**

Dynamics of coastal areas. Recognition of geomorphological features. Quantitative characterisation. Human activities on the coastal system. Direct and indirect interventions in the beach-dune system.

**4. Techniques for the analysis of extreme weather events I**

Selection, characterisation and analysis of rainfall events. Brief characterisation of extreme Mediterranean rainfall. Sources of information and registration of precipitation. Selection criteria for rainfall events. Characterisation of episodes through statistical indicators.

**5. Techniques for the analysis of extreme weather events II**

Analysis of extreme weather events and their relationship with sea temperature. Genetic factors of heavy precipitation. Sea surface temperature (SST) and its relationship with heavy rainfall.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Classroom practices	25,00	100
Other activities	19,00	100
Theory classes	10,00	100
Seminars	6,00	100
Tutorials	2,00	100
Development of individual work	90,00	0
Preparation of practical classes and problem	70,00	0
Resolution of case studies	28,00	0
<b>TOTAL</b>	<b>250,00</b>	

**TEACHING METHODOLOGY**

This course is based on the use of different learning activities which include the following:

Participatory lectures:

- Presentation of theoretical content and classroom discussion.
- Comparison with future experiences and critical analysis.
- Reasoned selection of different proposed solutions.





Practical classes: preparation of a practical assignment with the support of classroom explanations.

- Use of GIS (ARC MAP) for dealing with basic digital cartography, collection of new information from WMS, reading of scientific papers and studies and production of an analysis of the situation in a neighbouring coastal space.
- Approach to and resolution of applied cases
- Database processing

Reading of scientific papers and manuals

Independent study

Tutorials

## EVALUATION

Assessment of learning will take account of one or several of the components proposed by the module lecturers:

Continuous assessment based on attendance and participation in class. Attendance at and participation in field trips (compulsory).

Preparation of assignments or reports proposed by the lecturer. Reading and summary of research articles.



Completion of an objective test on basic knowledge taught.

The assessment model is based on the following apportionments:

Attendance at the classes (minimum of 80% attendance)

- Test: up to 40%
- Essays and directed practicals: 30% -50%
- Supplementary activities: 30% -50%

## REFERENCES

### Basic

- GONZÁLEZ DEL TÁNAGO, M. (2005): La restauración de los ríos y sus riberas. En: E.Cruz, L. Babiano & J.M. Alonso (eds.): La restauración de la Cuenca del Guadalquivir. Aportar ideas para construir realidades: 15-29. Confederación Hidrográfica del Guadalquivir, Ministerio de Medio Ambiente.
- RRC (RIVER RESTORATION CENTRE) (1999): Manual of River Restoration Techniques. River Restoration Centre, Silsoe, U.K.
- GRIFFITH, D. A. and Amrhein, C. G. Multivariate statistical analysis for geographers. 1997. Prentice-Hall, Inc.345 pp.
- AGÈNCIA CATALANA DEL AGUA UNIVERSIDAD POLITÉCNICA DE VALENCIA (2006b). Validación biológica del régimen de caudales de mantenimiento definido en el Plan Sectorial de las Cuencas Internas de Cataluña en 10 tramos fluviales. Departament de Medi Ambient i Habitatge. Barcelona.



- BROOKES, A. (1989): Channelized rivers: perspectivas for environmental management. John Willey & Sons, Chichester, 366 pp.
- CAMARASA, A.M. (1993): La estructura interna de las tormentas mediterráneas, Cuadernos de Geografía, nº 54, pp. 169-188.
- CERDA, A. AND S. H. DOERR (2005). "Influence of vegetation recovery on soil hydrology and erodibility following fire: an 11-year investigation." International Journal of Wildland Fire 14(4): 423-437.
- CHERGUI B., FAHD S., SANTOS X., PAUSAS J.G. (2018). Socioeconomic factors drive fire regime variability in the Mediterranean Basin. Ecosystems 21(4): 619-628
- ESTRELA, M. J., PEÑARROCHA, D., PASTOR, F., AND MILLÁN, M. M. (2000) Torrential events on the Spanish Mediterranean coast (Valencian Region). Spatial precipitation patterns and their relation to synoptic circulation. En: Mediterranean Storms. (Claps, P. and Siccardi, F., eds.): 97-106.: Editoriale BIOS.
- GARCÍA-FAYOS, P. (2004). Interacciones entre la vegetación y la erosión hídrica. En Ed. Valladares, F. Ministerio de Medio Ambiente. Organismo Autónomo de Parques Naturales, Madrid, pp. 309-334.
- GRAY, D.H. y SORTIR, R.B. (1996). Biotechnical and Soil Bioengineering Slope Stabilization. A Practical Guide for Erosion Control. John Wiley & Sons, Inc
- HARRIS, J.A., PALMER, J. y BIRCH, P. (1996). Land Restoration and Reclamation: Principles and Practice. Prentice Hall 248 pp
- LEY VEGA DE SEOANE, C., GALLEGU FERNÁNDEZ, J.B. Y VIDAL PASCUAL, C. (2007): Manual de restauración costera, Ministerio de Medio Ambiente, Dirección General de Costas ([http://www.mma.es/portal/secciones/acm/aguas\\_marinas\\_litoral/zonas\\_costeras/tipos\\_litoral/sistemas\\_dunares/](http://www.mma.es/portal/secciones/acm/aguas_marinas_litoral/zonas_costeras/tipos_litoral/sistemas_dunares/))
- MINISTERIO DE MEDIO AMBIENTE (2008b): Directrices para el tratamiento del borde costero, Secretaría general para el Territorio y la Biodiversidad, Dirección General de Costas, 33 pp. En [http://www.mma.es/secciones/acm/aguas\\_marinas\\_litoral/directrices/pdf/directrices\\_sobre\\_borde\\_costero.pdf](http://www.mma.es/secciones/acm/aguas_marinas_litoral/directrices/pdf/directrices_sobre_borde_costero.pdf)
- MINISTERIO DE MEDIO AMBIENTE (2008): Directrices sobre actuaciones en playas, Secretaría general para el Territorio y la Biodiversidad, Dirección General de Costas, 41 pp. En [http://www.mma.es/secciones/acm/aguas\\_marinas\\_litoral/directrices/pdf/directrices\\_sobre\\_playas.pdf](http://www.mma.es/secciones/acm/aguas_marinas_litoral/directrices/pdf/directrices_sobre_playas.pdf)
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- TRAGSA (1994): Restauración hidrológico forestal de cuencas y control de la erosión. Ediciones MundiPrensa. Madrid





### Additional

- CAMARASA, A. M. Y LÓPEZ-GARCÍA, M.J. (2006): Criterios de selección y caracterización de episodios de lluvia. Aplicación a la Confederación Hidrográfica del Júcar (1989-2003). En: Clima, Sociedad y Medioambiente, A.E.C., serie A, nº 5, pp. 323-336
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- JACOBSEN, A. L. AND R. B. PRATT (2018). "Extensive drought-associated plant mortality as an agent of type conversion in chaparral shrublands." New Phytologist 219(2): 498-504.
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### ADDENDUM COVID-19

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

#### 1. Contents

The contents initially included in the teaching guide are maintained

#### 2. Workload and time schedule

The activities and their hours of dedication in ECTS credits marked in the original course guide will be kept. If the classrooms capacity according to the sanitary norms allows it, the theoretical and practical class attendance will be 100%; if the capacity couldn't be guaranteed, the class attendance would be reduced, replacing face-to-face classes with synchronous non-face-to-face teaching.



If the sanitary situation changes and no access to the University facilities is possible, all teaching activities will be carried out completely online (synchronous non-classroom teaching). In this case, the adaptations will be communicated to the students through the Virtual classroom.

### **3. Teaching Methodology**

Theory and practice classes that may be complemented with different types of materials and activities in the Virtual classroom.

Tutorials will be done online (through the UV corporate mail) or face-to-face by prior appointment with the teacher.

If the sanitary situation changes and no access to the University facilities is possible, teaching and tutorials will be carried out completely online. In this case, the adaptations will be communicated to the students through the Virtual classroom.

### **4. Evaluation**

The evaluation criteria established in the Course Guide are kept.

If the University facilities were closed on the dates set in the official calendar for the exams, the face-to-face exam would be replaced by an online test.

### **5. Bibliographic references**

The recommended bibliography in the Course Guide is kept. If the sanitary situation changes and the access to the recommended bibliography is not possible, it will be replaced by materials accessible online.