

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

Code	41055
Name	Restoration of the environment and analysis of climatic alterations
Cycle	Master's degree
ECTS Credits	10.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
2001 - M.D. in Environmental and Territorial Management Techniques	Faculty of Geography and History	1	Second term

Subject-matter

Degree	Subject-matter	Character
2001 - M.D. in Environmental and Territorial Management Techniques	3 - Methods and techniques for the analysis of the physical environment	Optional

Coordination

Name	Department
SEGURA BELTRAN, FRANCISCA	195 - Geography

SUMMARY**ALTERATION AND RESTORATION OF NATURAL SYSTEMS**

Traditionally, and especially in these recent decades of increased technological predominance, the management of natural systems has been dominated by an economic point of view which conceives nature as a resource, uses it primarily as a source of energy and materials (slopes, rivers) and exploits it as a public space (beaches, rivers). This abusive use of natural systems has led to the alteration of practically the entire territory, leaving few unaltered spaces. However, increasingly serious environmental problems are causing greater environmental awareness. It is because of that the public administration is promoting restoration actions of the different ecosystems. This subject will analyse the most common alterations and the restoration proposals that are being carried out – often on an experimental basis – in the different natural systems.

The subject Alteration and Restoration of Natural Systems is part of the module **Restoration of the**



natural environment and analysis of climatic changes, included in the Master's Degree in Environmental and Territorial Management Techniques, and is worth a total of 6 credits. The course is structured around three blocks, each of which will be taught by specialist lecturers:

Block I: "Alteration and restoration of river systems" (Francisca Segura: 2 cr., María González: 1 cr.)

Block II: "Restoration of slopes and vegetation cover" (P. García-Fayos and E. Bochet: 1 cr.)

Block III: "Alteration and restoration of coastal resources" (J. E. Pardo: 2 cr.)

EXTREME HYDROMETEOROLOGICAL EVENT ANALYSIS TECHNIQUES:

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

The subject "Techniques for the analysis of extreme hydro-meteorological events" is inserted within the module **Restoration of the natural environment and analysis of climatic alterations** of the Master Techniques for the Management of the Environment and Territory with a total of 2 credits. Therefore, and in order to provide a suitable selection for the Mediterranean environment of the main methods of analysis of extreme hydrometeorological events, the subject is structured in two blocks:

Block I: Techniques for the analysis of climatic changes and meteorological study of extreme events and their relationship with sea water temperature (María José Estrela: 1cr).

Block II: Selection, characterization and analysis of rain events (Ana Camarasa: 1cr).



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

OUTCOMES

2001 - M.D. 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

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
TOTAL	250,00	

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.
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- 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.
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- 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., GALLEGO FERNÁNDEZ, J.B. Y VIDAL PASCUAL, C. (2007): *Manual de restauración de costas*, Ministerio de Medio Ambiente, Dirección General de Costas (disponible en 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
- 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
- SEGURA BELTRAN, F. (2014): "Sobre la restauració fluvial i la complexitat dels rius efímers: algunes consideracions crítiques." *Cuadernos de Geografía* 95.96 (2014): 101-147
- TORMO, J., BOCHET, E., GARCÍA-FAYOS, P. (2009). Restauración y revegetación de taludes de carreteras en ambientes mediterráneos semiáridos: procesos edáficos determinantes para el éxito. *Ecosistemas*, 18 (2), 79-90.
- 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
- DE LUIS, M., J. RAVENTOS AND J. C. GONZALEZ-HIDALGO (2005). "Fire and torrential rainfall: effects on seedling establishment in Mediterranean gorse shrublands." *International Journal of Wildland Fire* 14(4): 413-422.



- DOSWELL III, C. A., RAMIS, C., ROMERO, R., AND ALONSO, S., 1998. A diagnostic study of three heavy precipitation episodes in the Western Mediterranean region. *Weather and forecasting*, 13, 102-124.
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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.