Universitat de Lleida

DEGREE CURRICULUM

TÈCNIQUES AVANÇADES DE DIAGNÒSTIC

Coordination: BLANCO RODRÍGUEZ, MIGUEL ÁNGEL

Academic year 2022-23

TÈCNIQUES AVANÇADES DE DIAGNÒSTIC 2022-23

Subject's general information

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<tr><td>Subject name</td><td>TÈCNIQUES AVANÇADES DE DIAGNÒSTIC</td></tr>
<tr><td>Code</td><td>102448</td></tr>
<tr><td>Semester</td><td>2nd Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
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<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Double degree: Bachelor's degree in Forest Engineering and Bachelor's degree in Nature Conservation</td><td>4</td><td>COMPULSORY</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
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<tr><th>Activity type</th><th>PRACAMP</th><th>PRAULA</th><th>TEORIA</th></tr>
<tr><td>Number of credits</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Number of groups</td><td>1</td><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>BLANCO RODRÍGUEZ, MIGUEL ÁNGEL</td></tr>
<tr><td>Department</td><td>AGRICULTURAL AND FOREST ENGINEERING</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Catalan and Spanish</td></tr>
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TÈCNIQUES AVANÇADES DE DIAGNÒSTIC 2022-23

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
BLANCO RODRÍGUEZ, MIGUEL ÁNGEL	miguelangel.blanco@udl.cat	4	
VERICAT QUEROL, DAMIAN	damia.vericat@udl.cat	2	Arrange by email

Subject's extra information

This subject is included in the double degree in Forestry Engineering and Nature Conservation.

It is a subject that teaches techniques and methods for the diagnosis and evaluation of the state of the natural environment through spatial analysis of the territory (in the broadest sense), combining geographic information technologies (GIS and remote sensing) with statistical analysis and fieldwork, which will ultimately be applied to the resolution of problems of planning and management of the territory.

The natural environment is subject to constant spatial and temporal changes. Under normal conditions, the dynamics of the natural environment are mainly related to the adaptation of flora and fauna to the existing climatic and environmental conditions, including topographic modeling. In the current context of global change, the factors controlling the arrangement of environmental elements are under new pressures that threaten their sustainability. In addition, Global warming may influence the medium to the long-term disposition of species, altering habitats and biodiversity. Similarly, anthropic pressure significantly conditions the state of forest stands, the disturbance regime (or the frequency and type of disturbances), and even introduces new agents (invasive species, parasites, etc.) that condition natural dynamics. Determining their state and evolution is essential to develop and implement effective corrective or management measures. In this sense, having the appropriate tools for early diagnosis is fundamental. This subject introduces analysis techniques at multiple temporal and spatial scales. In the same way, basic knowledge will be acquired for the design of field campaigns to obtain data, the selection and use of available environmental information for the multi-temporal monitoring of the territory based on remote sensing techniques.

By the way, the main subject descriptors are **Environmental diagnoses. Disturbances. Vegetation dynamics. Design of field campaigns. Sampling. Remote sensing. Fieldwork. Topographic modeling. Digital image processing. Geographic Information Systems.**

Learning objectives

Knowledge objectives. Understand and demonstrate knowledge of:

- The role of the natural environment and the importance of nature conservation, the factors that determine its state and its main threats.
- Concepts and methods for designing field campaigns and selecting appropriate data for solving environmental problems. Obtaining geospatial information.
- The main physical bases of remote sensing, its advantages and limitations in studies of the natural environment, as well as image analysis techniques (visual interpretation and digital processing).
- Analysis techniques and functions for the resolution of particular cases in territorial analysis.

Competences

- CB3. Students have the ability to gather and interpret relevant data (usually within their area of study) in order to make judgements that include a reflection on relevant social, scientific or ethical issues.
- CB4. Students are able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
- CB5. That students have developed the necessary learning skills to undertake further studies with a high degree of autonomy.
- CT3. Acquire skills in the use of new technologies and information and communication technologies.
- CT5. Acquire essential notions of scientific thought
- CG1. Demonstrate the ability to plan and organise personal work.
- CG4. Understand and express oneself with the appropriate terminology.
- CE6 Carry out diagnoses of the ecological processes that affect habitats, species, landscapes and ecosystems in order to maintain the ecosystem services that contribute to human well-being.

Subject contents

The course is structured in three main blocks. Each of the blocks and the contents to be developed in them are presented below. including the practical exercises and the synthesis report that the students will have to elaborate based on a specific case study. a specific case study.

BLOCK I: INTRODUCTION AND REVIEW OF CONCEPTS

1. Concepts related to diagnosis and the natural environment (3 hours):

- State and characterisation of the natural environment
- Disturbance regime
- Dynamics, change and evolution of the environment

2. Techniques of analysis (20 hours):

- Scientific method

PRACTICE 1: Formulation of hypotheses following the scientific method

- Remote sensing techniques: Digital Photogrammetry, Laser Scanning (LiDAR), Multispectral imaging.

PRACTICE 2: Visualisation of LiDAR information.

PRACTICE 3: Visualisation of multispectral information and index calculations.

- Exploratory analysis and classification techniques.

PRACTICE 4: Classification of satellite images.

BLOCK II: OBTAINING GEOSPATIAL INFORMATION.

Experimental and field campaign design (4 hours):

- Establishment of hypotheses and objectives.
- Determination of analysis techniques.
- Sampling strategies.

PRACTICE 5: Obtaining data based on the hypotheses formulated in Practice 1.

BLOCK III: CASE STUDY

Case Study 1. Data collection and integration for the characterisation of the natural environment and diagnosis (12 hours):

1. Data collection in the field (field work, one day session).
2. Analysis of field data: techniques and opportunities.

FIELD REPORT TOGETHER WITH A LITERATURE REVIEW BASED ON THE TECHNIQUES AND METHODS EVALUATED IN CASE STUDY 1.

Diagnosis of post-disturbance vegetation recovery (22 hours):

1. Calculation of explanatory variables
2. Spatio-temporal evolution of the response variable
3. Diagnosis: evaluation of post-fire regeneration

Methodology

The course is based on a combination of theoretical expositions, where the necessary concepts and methods are presented, with practical sessions. Practical activities include tutored classroom exercises, individual work sessions and field trips.

Development plan

According to the calendar and the schedule established by the ETSEA's Head of Studies.

Evaluation

The assimilation of concepts developed in the theoretical and practical sessions, the practices, and the final synthesis report on the Case Study will be evaluated. In addition, The report will be publicly defended as part of the evaluation. The following are specific details regarding the evaluation.

The subject is evaluated according to the following weighting:

- Theoretical part: 40% of the final grade
- Practical part (including reports): 60% of the final grade.
- Calculation of the overall grade of the course: Exam 1 x 0.4 + Practicals x 0.2 + Reports x 0.4

	Number of tests	Weighting (% of the total grade)
Written test on concepts and practices	Exam	40%
Submission of exercises.	Practices	20%
Study case • Case 1 • Case 2	Informes • Report case 1 • Report case 2 • Presentation case 2	40% (total) • 15 % • 20% • 5 %

THEORETICAL PART: **In order to pass the course, a mark ≥ 4.0 must be obtained in the theoretical part.** This is independent of the internship grade. In other words, the practical part does not count until the above minimum requirement is met.

PRACTICAL PART: The minimum grade to pass the practical part must be 5.0. The evaluation of the case study is based on the delivery of two reports (case study 1 and case study 2) and the oral presentation of case study 2. In order to prepare the report of case study 1, it will be necessary to have participated in the field campaign (compulsory field trip). In case there are 3 or more practicals with a grade lower than 5, the practical part will not be evaluated and it will be necessary to make up the failed practicals. The failed practicals (maximum 2) may be counted for the calculation of the average mark for the course as long as they have a mark ≥ 4.0. The overall mark for the case studies must be higher than 4.0 to be included in the final mark for the course; if it is lower, they must be made up.

- **Each practical and report will have a specific due date. The delay in the delivery of the practical and/or reports will be penalized with -30% of the mark of the practical or report delivered after the deadline. The copying of any part will be a 0 of the report and/or practical.**

Bibliography

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