



DEGREE CURRICULUM

TÈCNIQUES AVANÇADES DE DIAGNÒSTIC

Coordination: BLANCO RODRÍGUEZ, MIGUEL ÁNGEL

Academic year 2023-24

Subject's general information

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

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

Continuous evaluation:

Theory Block (essential/compulsory)

- Exam (Theory/Concepts). There will be an exam that accounts for 40% of the final grade of the subject. It is necessary to pass the exam in order to be able to take into account the grade of the internship. In the case of not passing the theory exam, the student will have the right to retake it (second-chance).

Block of practical exercises (essential/compulsory)

- Practical Exercises: Continuous evaluation of the exercises carried out during the practical classes (20% of the final mark). Practical exercises will be carried out following the contents and distribution of credits of the subject. Continuous and mandatory delivery according to the set delivery dates. To take the average of the subject the minimum grade must be a 5. In no case can an exercise have a grade lower than 4. In the event that the average of the practicals is lower than 5 must be delivered within the second-chance period. Failure to attend practice classes could have a penalty on the corresponding practice grade.

Case Study Block (essential/compulsory)

- Case study reports and oral presentation of results. There will be two case studies. The block of case studies represents 40% of the final mark of the subject. This block is retrievable and to choose to take the average of the subject the minimum grade must be a 5.

Second-chance

- In the event that the exam, practices or reports do not obtain a minimum grade of 5, they must be retaken within the period set by the center. In the case of recovery, the maximum grade for the practices and case studies cannot be higher than 5.

Plagiarism or copying (practice and report)

- Law 2/2022 on university coexistence regulates what is considered academic fraud: any premeditated behavior tending to falsify the results of an exam, one's own or someone else's, taken as a requirement to pass a subject or certify academic performance. Offenses can be serious or very serious. You can consult the UdL's Regulations on university coexistence.
- When copy is detected:

If copying or plagiarism is done with fraudulent means, the assessment activity will be withdrawn (therefore it will be suspended) and a report and the evidence will be sent to the coordination of the degree and to the heads of studies to start a disciplinary file. The applicable sanctions include, among others and depending on the seriousness of the fault, the loss of the right to be evaluated for the subject, the loss of enrollment for a semester or a course or expulsion for up to three years .

If there is spontaneous copying between students (behaviours such as speaking in an exam, looking at a colleague's exam, etc.) measures will be applied that may lead to the withdrawal of the activity (therefore, it is suspended). A report will also be made to the coordination of the degree and to the heads of studies if it is considered appropriate to open a disciplinary file.

Alternative assessment/evaluation

Students who combine their studies with a full-time job and/or due to family reconciliation have the right to request an alternative assessment at the beginning of the semester. The student who wants to take part in the alternative assessment must present a work contract or justify, in writing addressed to the director of the center, the reasons that make it impossible for him or her to take the continuous assessment within a period of five (5) days from the beginning of the semester. For more information, send an email to the ETSEAFIV Secretariat (etsea.secretariacentre@udl.cat). The alternative assessment test will consist of an exam (40% of the mark), the practical delivery (20% of the mark) and the case study reports (40% of the mark). All tests are recoverable.

SUMMARY

	Type	Weighting (% of the total grade)
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Written test on concepts	Exam	40%
Exercises.	Practices	20%
Study cases <ul style="list-style-type: none"> • Case 1 • Case 2 	Reports <ul style="list-style-type: none"> • Report case 1 • Report case 2 • Presentation case 2 	40% (total) <ul style="list-style-type: none"> • 15 % • 20% • 5 %

Bibliography

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Felícísimo, A., (1994): Modelos digitales de terreno. Introducción y aplicaciones en las ciencias ambientales.

Pentalfa Ediciones, Oviedo, 220 pp. Disponible a <http://www6.uniovi.es/~feli/pdf/libromdt.pdf>

Martínez-Casanovas, JA. (1999) : Quaderns d'informació núm. 25. Modelos digitales de terreno: estructuras de datos y aplicaciones en análisis de formas del terreno y en edafología. Departament de Medi Ambient i Ciències del Sòl. Universitat de Lleida. 55p. Disponible a

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Quirós, E. (2014): Introducción a la Fotogrametría y Cartografía aplicadas a la Ingeniería Civil. Universidad de Extremadura, Cáceres, 139p. Disponible a https://mascvuex.unex.es/ebooks/sites/mascvuex.unex.es.mascvuex.ebooks/files/files/file/Fotogrametria_9788469713174_0.pdf