1. Introduction

Data of the subject

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<th>Optative</th>
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<th>11907 / 11376</th>
</tr>
</thead>
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<tr>
<td>ECTS:</td>
<td>3</td>
<td>Contact hours:</td>
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<td>Semester:</td>
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<td>Non-contact hours:</td>
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<td>Language (%):</td>
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<td>Faculty:</td>
<td>ETSEA</td>
</tr>
<tr>
<td>English:</td>
<td>100</td>
<td>Department:</td>
<td>MACS</td>
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Background

The course teaches basic techniques and methods for the representation and spatial analysis of land and territory (in the broadest sense), with the ultimate goal of problem solving and land planning.

Remote sensing is the science that involves the detection, identification, classification and analysis of the ground cover, land use and phenomena occurring at the Earth surface through remote sensors installed in airborne or space platforms. Meanwhile, Geographic Information Systems (GIS) is the science and technology oriented to manage, query, update, analyze and model spatial information generated through surveying methods and / or remote sensing, in an integrated manner.

GIS and remote sensing are based on the management of specific hardware and software. The use of these technologies is of great interest and application in other matters of the MsC degree, particularly those related to the mapping of land use and vegetation cover, management of forest systems, territorial and environmental planning, forest fires, reforestation, analysis of changes in ground cover, landscape analysis, environmental impact assessment or watershed hydrologic analysis, among others.

In summary, the basic descriptors of the course are: Remote Sensing. Physical principles of remote sensing. Techniques of remote sensing data acquisition. Digital image processing. Geographic Information Systems. GIS data structures (Vector and Raster). Spatial analysis of land information.

Requirements

There are not previous requirements, except basic skills on computers.

Professor

<table>
<thead>
<tr>
<th>Name:</th>
<th>José Antonio Martinez Casasnovas (parte SIG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty:</td>
<td>ETSEA</td>
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<tr>
<td>Department:</td>
<td>Environment and Soil Science</td>
</tr>
<tr>
<td>Office:</td>
<td>3.09</td>
</tr>
<tr>
<td>Tel:</td>
<td>973702615</td>
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<tr>
<td>Email:</td>
<td><a href="mailto:j.martinez@macs.udl.cat">j.martinez@macs.udl.cat</a></td>
</tr>
</tbody>
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2. Learning objectives

Knowledge objectives. A student who pass the subject must understand and demonstrate knowledge in:

- The role of GIS and Remote Sensing in the acquisition, processing and analysis of information from the territory for inventory, planning and management.
- The nature and the physical basis of remote sensing techniques and the advantages and limitations of remote sensing for use in studies of the territory.
- The image analysis techniques (visual interpretation and digital processing), for subsequent application in the resolution of individual cases of inventories of natural resources and environment.
- Modeling structures of information relating to the territory, both thematic and topographic (geometry + attributes) in GIS.
- The main techniques and analysis functions of GIS, for subsequent application in the resolution of individual cases of natural resource inventories and/or environmental studies.
- The main sources of information and other resources related to these geographic information technologies and their application to forestry.

Capacity objectives (competencies). A student who pass the subject must be able of:

- Applying the knowledge about data structures in the representation of land information when creating geodatabases.
- Define and apply the techniques of remote sensing image analysis (visual interpretation and digital processing) and technical analysis functions of geographic information using GIS software, to solve special cases of planning, analysis and forest management.
- Solve problems, aimed at planning and management of forest resources through the application of integrated remote sensing techniques and GIS, and know where to acquire additional knowledge on the subject.
- Prepare and present thematic mapping processes resulting from analysis of geographic information as a communication tool in planning and land management.

3. Program

Lessons

Lesson 1. INTRODUCTION TO GIS. Concept of geo-information and components.

Lesson 2. GEOINFORMATION CHARACTERISTICS. Geographic objects and phenomena. Measurement scales of the descriptive information.

Lesson 3. VECTOR DATA MODEL. Types of GIS vector structures: topological and "shapefile". GIS vector analysis: selection of attributes and location, geo-table join, union and intersection.


**Practical training**


Exercise 3. Creation and edition of vector layers in ArcGIS. Digitizing, table management and map layout creation.


Exercise 7. Cartographic modelling in GIS: Mapping the possibility of vegetation regeneration after a forest fire.


Exercise 10. Image processing: classification of multispectral images

Exercise 11. Case study.

Exercise 1 (Computer Room): Visualization and radiometric correction of multispectral images


Exercise 3 (Computer Room): Supervised classification of multispectral images.
### 4. Timing of the learning activities

<table>
<thead>
<tr>
<th>Type of activity</th>
<th>Description</th>
<th>Classroom activity</th>
<th>Home activity</th>
<th>Assessment</th>
<th>Time and credits</th>
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<tbody>
<tr>
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<td></td>
<td>Objectives</td>
<td>Hours</td>
<td>Student work Hours</td>
<td>Hours</td>
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<tr>
<td>Lecture</td>
<td>Lecture (concepts and examples)</td>
<td>Explanation of the Basic concepts</td>
<td>6</td>
<td>Study: To know, understand and synthesize knowledge</td>
<td>33</td>
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<tr>
<td>Practical exercise</td>
<td>Practical exercises in computer room</td>
<td>Exercises to understand the concepts and acquire skills in processing and analyzing data using computer software</td>
<td>24</td>
<td>Study and answer questionnaires</td>
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* The assessment is based on online test and the presentation and correction of practical exercises.
5. Assessment

Activities

<table>
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<th>Type of activity</th>
<th>Assessment activity</th>
<th>Weight (% )</th>
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<tr>
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<td>Practical exercise</td>
<td>Answers to the practical exercises</td>
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Observations

To be able to pass the subject is required to perform all activities. It is also required to obtain a grade equal to or greater than 5 in each of the evaluation activities (examinations of theory, computer classroom practices).

7. Recommended references

Basic

- Chuvieco, E., 2010. Teledetección ambiental: La observación de la Tierra desde el Espacio, 2a Edición, Ariel, Barcelona.

Complementary


