Universitat Autònoma de Barcelona

2020/2021

Remote Sensing and Photointerpretation

Code: 101611
ECTS Credits: 6

Degree	Type	Year	Semester
2501002 Geography and Spatial Planning	OT	3	0
2501002 Geography and Spatial Planning	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Other comments on languages

It is necessary to be able to read scientific and technical texts in English

Teachers

Alaitz Zabala Torres

Prerequisites

Having completed a first course in Geographic Information Systems is advisable, but not essential, as well as having basic knowledge of Cartography.

Many of the bibliography of the subject is in the English language, so the student should be able to at least read in that language.

Objectives and Contextualisation

In recent years, remote sensing has became a basic tool in geographic analysis thanks to the systematic availability of satellite images and, increasingly, aerial images, whether from aircraft or, lately , from UAV devices like drones. The discipline has experienced a spectacular evolution since the first images available for civil use in the early 1970s to the present day. Nowadays there are many orbiting sensors around the earth's surface that allow us to analyze it in a way never seen. In this sense, the subject represents an interesting opportunity to understand the scope of Remote Perception as a discipline and its contribution to the urban systems knowledge.

In the course, it is not intended to train in a specific software. The message is that in the case of a case of use, the student must know (or learn if necessary) the necessary concepts, understand what strategies it is

appropriate to apply and know what tools are available. With this in mind, the maturity of the case of use will allow you to find out what features you need in each situation and choose or adapt to the possibilities that you will find at each moment and place of the future development of your activity.

Among the objectives presented in the course, which are both theoretical and practical, we should highlight:

- Know the main platforms and sensors available in Remote Sensing. This objective will be achieved through theoretical discourse and a search exercise to be carried out by the students.
- Understand the nature of multispectral images and the characteristic response of the main types found in the soil. The theoretical discourse will be dressed with a series of examples from the most conceptual point of view (spectral band, spectral signatures, electromagnetic spectrum), as practical (evaluation and interpretation of spectral signatures of different covers, compositions with false color, etc.). The practical part of the subject, then, will begin with the definition of the legend and the demonstration of the spectral separability of different ground coverings.
- Know how to perform the basic treatment of the images, from their acquisition to their exploitation for categorical thematic cartography. This objective will be achieved in several cases applied until it achieves the thematic accuracy of the obtained cartography.

Learn about applied examples in urban areas: land use and land cover, heat islands, air quality, etc...

Competences

Geography and Spatial Planning

- Analysing and interpreting landscapes.
- Developing critical thinking and reasoning and communicating them effectively both in your own and other languages.
- Mastering the different forms of management and acquisition of geographic information as interpretation tools of territory, and maps and Earth observation imagery in particular.
- Producing innovative and competitive proposals in research and professional activity.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must develop the necessary learning skills in order to undertake further training with a high degree of autonomy.

Learning Outcomes

1. Analysing and interpreting landscapes using quantitative and qualitative methodology.
2. Analysing the main dynamics of today's world from a geographical point of view.
3. Contrasting and comparing relevant geographical data.
4. Distinguishing the various methods of geographical information retrieval of the Earth observation imagery.
5. Drawing up innovative proposals.
6. Identifying the ideas and expressing them in various languages with linguistic correctness.
7. Producing an individual work that specifies the work plan and timing of activities.
8. Solving problems autonomously.
9. Summarising acquired knowledge about the origin and transformations experienced in its several fields of study.

Content

The various aspects to be developed in the subject are:

1. Overview of Remote Sensing.
2. The electromagnetic spectrum and the spectral signatures.
3. Remote sensing basic concepts: spatial, radiometric, spectral and temporal resolution.

4. Types of platforms and sensors. Main satellites and sensors.
5. Nature of the images. Formats. Elemental notions of geometric and radiometric corrections.
6. Reading and interpretation of satellite images in digital format.
7. Techniques of digital classification. Verification of results. Final cartographic refinement. Post-classification techniques.
8. Epilogue: Remote Sensing, Cartography and Geographic Information Systems.

The application in practical cases will be developed throughout the course, in an integrated way in the various subjects covered in the course.

Methodology

The contents of the subject will be developed through the following activities:

- Oral presentations and documentation and reading guides presented by the teacher.
- Reading of chapters of books or articles (individual activity of the students complementary to the classroom work).
- Teacher-guided class practices and practice development guides provided by the teacher.
- Practices carried out autonomously by the students based on proposals from the teachers.

For the accomplishment of the subject specific software will be used (MiraMon).

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Approach to the objective and method of solving the practices	15	0.6	1
Exposure of basic concepts	35	1.4	4
Field trip	0	0	1, 3
Type: Supervised			
Guided resolution of the practices in the computer lab	20.5	0.82	1, 3
Type: Autonomous			
Class practices done independently by the students	30	1.2	8
Preparation and presentation of results	15	0.6	6, 5
Study of theoretical material	30	1.2	8

Assessment

The evaluation activities are:

- Theoretical exam (40% of the grade) and practical exam (20% of the grade), carried out at mid-year and at the end of the course; The second exam may include any part of the first half of the course. These exams are in person. The dates of these exams are made public at the beginning of the course.
- Practical exercises delivered throughout the subject (20% of the grade), Comments on articles (10%) and Preparation and presentation of works (10%).

The subject is passed with a 5. The student who has presented less than 20% of the requested works as one that has not been submitted to any of the theoretical-practical tests will be considered "not evaluable".

The re-evaluation will be of all the theoretical and practical syllabus, within the dates stipulated for that purpose by the Faculty.

The copying or plagiarism of material, both in the case of works and in the case of examinations, constitute a crime that will be sanctioned with a zero to the activity. In the case of recidivism, the entire subject will be suspended. Let's remember that a "copy" is considered a work that reproduces all or most of the work of one or more partners. "Plagiarism" is the fact of presenting all or part of an author's text as its own, without citing the sources, whether in paper or in digital format. See UAB documentation on "plagiarism" at: http://wuster.uab.es/web_argumenta_obert/unit_20/sot_2_01.html.

In the event of a student committing any irregularity that may lead to a significant variation in the grade awarded to an assessment activity, the student will be given a zero for this activity, regardless of any disciplinary process that may take place. In the event of several irregularities in assessment activities of the same subject, the student will be given a zero as the final grade for this subject.

In the event that tests or exams cannot be taken onsite, they will be adapted to an online format made available through the UAB's virtual tools (original weighting will be maintained). Homework, activities and class participation will be carried out through forums, wikis and/or discussion on Teams, etc. Lecturers will ensure that students are able to access these virtual tools, or will offer them feasible alternatives.

For students of the online degree, they have the option of an identical evaluation as the face-to-face degree (face-to-face exams during the course and mandatory field activity), or they have the possibility of adapting to virtual oral exams (by video call MS Teams and flexible hours) and voluntary field activity.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Article comments	10 %	0	0	3, 6
Practical exams	20%. total. 1Ex P: 10%; 2Ex F: 10%	1.5	0.06	2, 3, 6, 8, 9
Practical exercises	20 %	0	0	8
Preparation and presentation of personal projects	10 %	0	0	1, 3, 7, 6, 5, 8
Theoretical exams	40%. total. 1Ex P: 20%; 2Ex F: 20%	3	0.12	2, 3, 4, 6, 9

Bibliography

Reference books and cartography

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- Díaz-Delgado, R., Lucas, R. and Hurford, C. (Eds.) (2017). "*The Roles of Remote Sensing in Nature Conservation. A Practical Guide and Case Studies*". Springer International Publishing AG2017. Pp. 318. Springer, Cham, Switzerland.
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- Jensen, J.R. (2004). *"Introductory Digital Image Processing. A Remote Sensing Perspective".* Prentice Hall. Englewood Cliffs. 544 pàgs. 3ª edició.
- Lillesand, T.M. i R.W. Kiefer (2007). *"Remote Sensing and Image Interpretation"*. John Wiley & Sons. N.Y. 768 pàgs. 6ª edició.
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Main scientific journals

- *Remote Sensing of Environment*. Elsevier Science Publishing Co. Inc.
- *IEEE Transactions on Geoscience and Remote Sensing*. Institute of Electrical and Electronics Engineers. També editen *IEEE Geoscience and Remote Sensing Letters*, amb articles més curts i una més ràpida dinàmica de publicació.
- *Photogrammetric Engineering & Remote Sensing*. American Society for Photogrammetry and Remote Sensing.
- *International Journal of Remote Sensing*. Taylor & Francis Ltd.
- *Canadian Journal of Remote Sensing*. Canadian Aeronautics and Space Institute
- *ISPRS Journal of Photogrammetry and Remote Sensing*. International Society for Photogrammetry and Remote Sensing.
- *International Journal of Applied Earth Observation and Geoinformation*. Elsevier Science Publishing Co. Inc.
- *Remote Sensing* (open access journal).
- *Revista de Teledetección* de la Asociación Española de Teledetección.

- *GeoFocus* de la Asociación de Geógrafos Españoles