COURSE DATA

DATA SUBJECT

Code: 43742
Name: Laboratory of instrumentation
Cycle: Master's Degree
ECTS Credits: 5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2162 - Master's degree in Remote Sensing	Facultat de Física	1	Annual

SUBJECT-MATTER

Degree	Subject-matter	Character
2162 - Master's degree in Remote Sensing	Fundamentals	COMPULSORY

COORDINATION

FRANCH GRAS BELEN

SUMMARY

The Instrumentation Laboratory course, together with the Fundamentals of Remote Sensing, compose the Fundamentals subject where the physical principles of remote sensing are provided and the students get familiar with the proper instrumentation of remote sensing measurements. In the specific laboratory part, the student uses basic measuring instrumentation that allows for the measurement of physical parameters for their comparison or calibration/validation of the measurements taken from satellites.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Not special previous requirements

COMPETENCES / LEARNING OUTCOMES

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Aplicar los conocimientos adquiridos con criterios de sostenibilidad de nuestro entorno.

Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.

Be able to access to information tools in other areas of knowledge and use them properly.

Entender el funcionamiento de los sensores de teledetección y el proceso de calibrado de los mismos, saber utilizar la instrumentación necesaria para la medida de magnitudes radiométricas y parámetros biofísicos y saber realizar el tratamiento y análisis de los datos que proporcionan.

Entender los fundamentos físicos de la Teledetección y ser capaz de aplicarlos en el análisis y tratamiento de los datos.

Exponer y defender públicamente el desarrollo, resultados y conclusiones de su trabajo de una manera clara y concisa.

Ser capaces de realizar una toma rápida y eficaz de decisiones.

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.

Trabajar en equipo con eficiencia.

DESCRIPTION OF CONTENTS

1. Spectroradiometers Characterization

The objective of this practical is to characterize two different spectroradiometers. This implies their respective calibration, analysis of their spectral and angular responses, accuracy determination and influence of temperature on their measurements.

2. Radiometric Measurements on Natural Surfaces

The objective of this practical is to get to know the procedure for spectrometric measurements and the spectral responde of some natural surfaces. The practical then consists of performing a series of radiometric measurements over some natural surfaces by using the GER-1500 radiometer.

3. Integración de datos ópticos y SAR: aplicación a la agricultura

Analizar imágenes del producto Harmonized Landsat and Sentinel-2 (HLS) e imágenes Sentinel-1 en la región agrícola de Kirovohrad (Ucrania) durante el periodo de desarrollo del trigo. Observar que tipo de correlación se puede obtener entre los datos ópticos y SAR. Determinar las fechas coincidentes entre optico y SAR para construir un modelo capaz de reproducir el índice de vegetación óptico Difference Vegetation Index (DVI). Aplicar el modelo a todas las fechas con adquisiciones de Sentinel-1 y evaluar la evolucion temporal del índice de vegetación simulado respecto al real.

4. Calibrado de radiómetros en el infrarrojo térmico. Medida de la emisividad y la temperatura de la superficie terrestre

Aprender el funcionamiento de radiómetros del IRT para la medida de la temperatura de la superficie. Calibrar dichos radiómetros con un cuerpo negro de temperatura variable. Medir la emisividad y la temperatura de distintos tipos de cubierta en distintas bandas espectrales del IRT mediante el método Temperature Emissivity Separation aplicado a medidas de campo. Analizar los resultados obtenidos en función de la composición de las muestras.

5. In-situ measurement of biophysical parameters of vegetation canopy

El objetivo de esta práctica es aprender la metodología en que se basa la medida de campo de algunas de las principales variables biofísicas de la cubierta vegetal. En particular, se realizarán medidas de clorofila mediante los instrumentos SPAD-502 (MINOLTA) y CCM-200 (OPTI-SCIENCES). Y, índice de área foliar (LAI) y fracción de cobertura vegetal (FVC) mediante instrumentación clásica LAI-2000 (LICOR) y el uso de nuevas tecnologías (apps instaladas en tabletas digitales).

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	5,00
Laboratory	25,00
Total hours	**30,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	70,00
Independent study and work	25,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**95,00**

TEACHING METHODOLOGY

A total number of five laboratory practicals will be carried out by the students. These take place in small groups (16 students), with a lecturer in charge of each subgroup. The sessions are dedicated to proper laboratory experiments where the students carry out the experimental setup and data collection. For each practical, the student must submit a report with experimental data collected and processed (errors, graphic settings, adjustments), as well as the conclusions drawn.

EVALUATION

La asignatura se evalúa, en primera convocatoria, en base a las memorias realizadas por los alumnos para cada una de las prácticas previstas durante el curso (5 en total). Cada memoria se puntuará de 0 a 10 teniendo en cuenta la evaluación científico-técnica de las memorias escritas. Para poder hacer media con la nota del resto de memorias del Laboratorio cada nota individual debe superior a 5 (sobre 10). En segunda convocatoria, el estudiante reelaborará, según las indicaciones del profesor, las memorias presentadas en primera convocatoria para superar la nota mínima. La asistencia al laboratorio es obligatoria.

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