COURSE DATA

Data Subject	
Code	43050
Name	Use of remote sensing to determine pollution
Cycle	Master's degree
ECTS Credits	2.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
2139 - M.U. en Contaminación, Toxicología y Sanidad Ambient. 12-V.2	Faculty of Biological Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
2139 - M.U. en Contaminación, Toxicología y Sanidad Ambient. 12-V.2	2 - Environmental pollution	Optional

Coordination

Name	Department
LOPEZ BAEZA, ERNESTO	345 - Earth Physics and Thermodynamics

SUMMARY

The subject ***Use of Remote Sensing for the Assessment of Contamination*** tries to provide students with an update knowledge on the use of remote sensing techniques for estimating environmental contamination from space.

The subject is introduced by providing the basis for the use of remote sensing as a review; observable contaminants by remote sensing and missions -satellites and sensors- engaged in this issue are explained in detail. It is also shown in a practical way how remote sensing images are interpreted in order to be able to extract the appropriate information. Currently, the remote sensing applications that are developed refer to

• Water Quality

• Atmospheric Ozone

• Wildfires

• Air Quality. Particulate Matter

• Megacities

the details of which are provided in the section on **Description of Contents**.

The usual remote sensing sensors currently used are adequately explained in each theme as well as an indication of the future forthcoming missions

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

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

OUTCOMES

2139 - M.U. en Contaminación, Toxicología y Sanidad Ambient. 12-V.2

- 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 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.
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- Capacidad de análisis, síntesis y razonamiento crítico en la aplicación del método científico.
- Capacidad para el aprendizaje autónomo y organizado y para la adaptación a nuevas situaciones.
- Comprensión del mundo natural como producto de la evolución y de su vulnerabilidad frente a la influencia humana.

- Desarrollo de un compromiso ético y capacidad de participación en el debate social.
- Diseñar y ejecutar proyectos para aplicar indicadores de sostenibilidad ambiental.
- Diseñar y ejecutar programas para la prevenir la contaminación del medio acuático continental y del litoral.
- Valorar los efectos del cambio climático.
- Realizar diagnóstico de problemas ambientales.
- Planificar la explotación racional de los recursos naturales renovables terrestres y acuáticos.
- Evaluar la calidad de aguas.
- Comprender e interpretar los procesos de contaminación de las aguas y sus efectos.
- Diseñar los indicadores específicos para un riesgo ambiental concreto.

LEARNING OUTCOMES

Skills to Acquire

- To properly handle scientific terminology and become familiar with their sources of information
- Ability to analyze data, selection of the right method, evaluation and critical interpretation of experimental results in their various forms of expression (tables, graphs ...)
- Acquire synthesis capacity to collect, in an organised and coherent way, information or data from various sources

Social Skills

- Develop capacity for critical thinking, encouraging communication and discussion in order to stimulate individual creativity
- Ability to work in groups when dealing with problematic situations collectively
- Ability to build an understandable and organised written text
- Capacity for public speaking, for example at the classroom itself, through exposition or taking part in a debate on a controversial topic or issue
- Ability to interact both with the teacher and with peers
- Interest in science outreach and on the impact of science in society’s culture and conscience

DESCRIPTION OF CONTENTS

1. Use of Remote Sensing for the Assessment of Contamination

Introduction to Remote Sensing Techniques
The Measurement from Satellites
The Electromagnetic Spectrum and its Application in Remote Sensing
The Atmosphere: Composition and Physical Processes
Characteristics of the Image: Spatial-, Temporal-, Spectral- and Radiometric- Resolution

Atmospheric Contaminants Observable by Remote Sensing
Satellites and Sensors for Atmospheric Contamination

Interpretation of Remote Sensing Images
Setting the Scale
Location of Patterns, Shapes and Textures
Defining Colours (Including Shadows)
Image Orientation
Consideration of Previous Knowledge of the Area

Remote Sensing Techniques Applied to Water Quality Assessment
This topic will mostly developed by Oceansnell <http://www.oceansnell.com>
Introduction and Motivation
Basis for the Use of Remote Sensing
General Background
Observation and Measurement of the Marine Environment: Methods and Technologies
Marine Contamination and Water Quality
Water Quality Parameters Measurable by Remote Sensing
o Temperature, Salinity, Dissolved Oxygen, Irradiance, Types of Chlorophyll, Turbidity

Estimation of atmospheric ozone by remote sensing. Comparison with Ozonesondes and Surface Stations
Reduction of the Ozone Layer
Tropospheric Ozone
The IASI (Infrared Atmospheric Sounding Interferometer) Sensor
The OMI (Ozone Monitoring Instrument) Sensor
The TOMS (Total Ozone Mapping Spectrometer) Sensor
Brewer and Dobson Spectrophotometers
Surface Stations
Towards Surface Ozone Estimation Using IASI

Evaluation of the Effects of Forest Fires Using Remote Sensing
Remote Sensing Sensors Used
Methodology. Remote Sensing Indices
Study and Quantification of Alcublas Forest Fire of Summer 2012 Using Remote Sensing Techniques

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	18,00	100
Development of group work	5,00	0
Study and independent work	12,00	0
Readings supplementary material	2,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	1,00	0
Resolution of case studies	10,00	0
TOTAL	**63,00**	

TEACHING METHODOLOGY

The subject is divided into:

• Theoretical lectures to develop the fundamental knowledge and the methodology used

• Practical classes to deal with practical issues about access to databases and use of remote sensing products

• Practical work on the application of remote sensing techniques to the estimation of atmospheric ozone and its comparison with surface measurements (spectrophotometers) and from the atmosphere itself (ozonesondes)

• 1.5 h Collective tutorial to respond to specific issues raised by the students

• In all activities, the Aula Virtual tool of the University of Valencia will be used for the exchange of documents and information

EVALUATION

- Assessment of the practical work on atmospheric ozone (50 %)
- Examination of the knowledge imparted in the theory classes (20%) and on the implementation of a practical case for individual resolution (20 %)
- Class attendance (10%)

REFERENCES

Basic

- NASA Earth Observatory <http://earthobservatory.nasa.gov>

  Remote Sensing Tutorial <http://www.fas.org/irp/imint/docs/rst>

  ESA Activities - Earth Observation - ENVISAT
  <http://www.esa.int/Our_Activities/Observing_the_Earth /Envisat>

Additional

- eoPortal - Earth Observation Directory & News <http://www.eoportal.org>

  URLs de misiones espaciales específicas

  Artículos de investigación e informes científicos específicos

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available