COURSE DATA

Data Subject	
Code	33091
Name	Environmental pollution evaluation
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1104 - Degree in Environmental Sciences	Faculty of Biological Sciences	2	Second term

Subject-matter

Degree	Subject-matter	Character
1104 - Degree in Environmental Sciences	144 - Evaluation of environmental pollution	Obligatory

Coordination

Name	Department
BOLUDA HERNANDEZ, RAFAEL	25 - Plant Biology
ESTELLES LEAL, VICTOR	345 - Earth Physics and Thermodynamics
MONTERO PAU, JAVIER	275 - Microbiology and Ecology

SUMMARY

Pollution is one of the most important problems affecting our environment. In this area, provide the basics to meet air pollutants, water and soil and their main forms of assessment and examines the legal framework that limits their levels in the environment.

It introduces the main pollution problems affecting each of the matrices, atmosphere, soil, water and biota, and provides an overview of the mechanisms for assessing environmental pollution.
In relation to air pollution are studied pollutant dispersion models, analyzes the characteristics of noise as a pollutant, the major indices of noise built into the legislation and gives a glimpse of light pollution as a form of contamination of the atmosphere that is waking up today.

With regard to water, as for the other matrices, anthropogenic impacts result in the alteration of natural features, leading to processes of eutrophication, acidification, or in general, increased concentrations of pollutants, processes which are studied in an introductory unit. Subsequently, the main biological methods and physical-chemical evaluation of water pollution are analyzed, with emphasis on biological quality elements designated in the Water Framework Directive, as well as common technical analytical indicators, both microbiological and physical-chemical.

On the other hand, the soil is one of the receiving of pollution more sensitive and vulnerable. Its proper functioning is essential for the maintenance of environmental quality. We will focus on the mechanisms of chemical degradation of the soil associated with polluting human activities and highlight the importance of maintaining soil quality in order to preserve their basic ecological functions.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

It is essential to have basic knowledge of the matters proposed by the first year in particular those that are integrated in the subjects Physics, Chemistry and Biology. It is also desirable to know a spreadsheet program such as Excel or statistical analyzer.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1104 - Degree in Environmental Sciences

- Capacidad de valorar la calidad del aire.
- Manejo de modelos de dispersión y redes de control de contaminantes
- Capacidad de analizar la contaminación lumínica y acústica.
- Conocer las técnicas de análisis y cuantificación de la contaminación.
- Capacidad de valorar la contaminación de suelos.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

- Knowledge of the origins and sources of pollutants.
- Knowledge of the main problems of environmental pollution.
- Knowledge of basic principles associated with the movement of contaminants in the environment.
- Ability to perform practical tasks involving problem solving, data analysis and critical interpretation.
- Ability to solve problems involving data collection in qualitative and quantitative laboratory analysis of these data and their interpretation in a theoretical context.
- Know how to evaluate the degree of contamination in air, water and soil, showing ability to evaluate clearly the orders of magnitude of different pollutants.

- Ability to perform experiments on the determination of physical, chemical and biological agents in air, water and soil.
- The scientific domain associated with dispersion models in air pollution and its application to case studies, using computer applications.
- Evaluation of light pollution and noise.
- Know how to access public information related to air quality, water and soil and to interpret correctly.

DESCRIPTION OF CONTENTS

1. INTRODUCTION TO ASSESSMENT OF ENVIRONMENTAL POLLUTION

Theme 1.- Assessment of Environmental Pollution
Course presentation. Concept of contamination. Environmental pollution. Units

2. Assessment of air pollution

Theme 2.- Classification of air pollutants and their sources
Classification of pollutants. The sources of air pollution.
Theme 3.- Air pollutants
Particulate matter. Sulfur Compounds. Carbon compounds. Nitrogen compounds. CFCs. Ozone. Metals and other pollutants. Reference measurement techniques. Legal framework.
Theme 4.- Atmospheric dispersion models
Dispersion models. Influence of meteorological processes in atmospheric pollution. Atmospheric stability. The Pasquill atmospheric stability classes. Box models. Gaussian air pollutant dispersion model for nonreactive pollutants. Plume rise equations. Practical examples.
Theme 5.- Physical and chemical processes in the atmosphere
Acid rain. Oxidation processes in the atmosphere. Photochemical smog. The loss of stratospheric ozone.
Theme 6.- Acoustic pollution: noise
Introduction: physical acoustics. Noise as a pollutant. Noise indices. Control of noise at workplace. Legal framework.
Theme 7 -. Light pollution
Light as a contaminant. Consequences of light pollution. Legal framework.

3. Assessment of water pollution

Theme 8.- Water pollution assessment. Overview
Polluting processes and their effects on aquatic ecosystems. Synopsis. Water quality evaluation in the Spanish and European legislation - the Water Framework Directive and its development; other legislation. Types of quality elements. Types of metrics. Types of analytical methods. Reference condition and guide values. EQR . Monitoring. control networks.
Theme 9.- Assessment of water pollution by using biological methods and integrated indices
Evaluation by biological methods. Phytoplankton: Other aquatic flora. Benthic invertebrates. Fish fauna. Microbial Indicators. Other biological quality elements. Integrated indices.
Theme 10 - Assessment of water pollution by physical- chemical and hydromorphological methods

Physical-chemical parameters measured in situ. Organoleptic properties. Mineralization. Inorganic nutrients. Aggregated estimators of organic pollution. Specific organic contaminants. Metals. Hydromorphological assessment.

4. Assessment of soil pollution

Theme 11.- Soil contamination
Soil and pollution. Origin, fonts and types of soil contamination. Main soil contaminants. Contaminant processes. Contaminants distribution in the soil. Mechanisms of contamination and soil-contaminant interactions. Inorganic contaminants. Organic contaminants. Biological contaminants. Effects of soil contamination.
Theme 12.- Methods for contaminated soil characterization
Analytical methods and techniques for soil contaminants determination. Calculation of reference values. Sampling and sample treatment. National and international experiences. Techniques for analysis of soil contaminants. Sampling Experiences at national and international level.
Theme 13.- Assessment of soil contamination. Legal framework
Regulations. Definitions. Criteria for consideration of a contaminated soil. Exploratory research of the soil quality. Detailed characterization of the soil. Risks identification and quantification.

5. Laboratory

The following practical exercises are performed:
Practice 1.- Acoustic measurement. Calculation of noise indices.
Practice 2.- Pollution control network at the Valencian Community. Analysis of inmission levels of various pollutants
Practice 3 .- Comparative evaluation of contamination of various water samples.
Practice 4 .- Determining fixing capacity of heavy metals in soil: influence of soil properties.

6. Computer lab

Activity where exercises are performed related to pollutant dispersion models using spreadsheet software to solve them.

7. Tutorials

Resolve questions about issues or problems proposed to students related to the subject.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	36,00	100
Laboratory practices	15,00	100
Computer classroom practice	6,00	100
Tutorials	3,00	100
Development of group work	15,00	0
Development of individual work	10,00	0
Study and independent work	16,00	0
Readings supplementary material	6,00	0
Preparation of evaluation activities	8,00	0
Preparing lectures	16,00	0
Preparation of practical classes and problem	8,00	0
Resolution of case studies	11,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The course consists of several activities:

• Theory (Classroom lectures)

• Laboratory

• Tutorials

• Computer Classroom

For each follow a different development methodology, as described below:

Theory

Blackboard classes of theory and practical exercises on the topics that require it, in which the teacher introduces students to the fundamentals of the topics covered by the program area. In the lectures, the teacher teaches content based on materials (presentations, notes, pictures and diagrams) to be provided to students in the virtual classroom. For practical exercises, when themes require it, the student will be provided with a bulletin with the statements and the professor will explain some of them as examples in detail. The rest of the exercises of the bulletin will be solved autonomously by the students.

Laboratory

In the laboratory sessions, mandatory, the groups are approximately 16 students and they work in pairs. Practical work, associated with the themes developed in the theory sessions, will be done supervised by a teacher. Students will present a report for each of the practices done that reflects the activity and will be evaluated by the teacher.

Computer Classroom

The computer classroom, mandatory, will be taught in groups of 32 students approximately and they work in pairs. In these sessions students, supervised by a teacher, do exercises in data processing of air pollution related to the use of atmospheric dispersion models using software for the processing of data

(spreadsheets). A report will be presented, which will be assessed by the teacher, with the collection of data and treatment used (errors, graphic settings), and the conclusions reached.

Tutorials

Tutorials, mandatory, are performed in subgroups of 16 students approximately. In them, the teacher monitors the work and progress of students and resolves the doubts raised. The teacher will review, correct and evaluate the exercises proposed in the lectures. Each student must submit the exercises, solved autonomously, for personalized assessment. The students will also show and discuss the previously assigned work.

EVALUATION

Evaluation of the matter will take into account the weight on hours of the various items:

A) Theory: 60%

The evaluation will be based on a written exam. The examination may consist of theoretical questions, in any possible formats, and numerical exercises, for those topics that require it, similar to those developed in classes. The final exam score will be obtained with a weighted average with weights given by 60% for atmospheric pollution, 20% for water pollution and 20% for soils pollution.

Each of the three parts needs a minimum score of 3 points on 10 points. The final score of the exam, must be higher than 4 points on 10 points to be further considered.

B) Laboratory: 25%

The practice work reports presented by the student will be evaluated. These work reports are mandatory, and they must be also submitted on due time. The minimum score of the laboratory part must be 4 on 10 points to be further considered.

C) Computer Classroom: 10%

The exercises submitted by the student will be evaluated. The exercises are mandatory and they must be also submitted on due time.

D) Tutorials: 5%

The problems made by the students during the course will be evaluated by the teacher (online questionnaires, exercises, assignments). These will be made autonomously, by pairs or by small groups, depending on the kind of assignment.

The final grade is determined by accounting the scores for sections A, B, C and D, provided that the student complies with criteria about submission deadlines and minimum scores in the different parts.

In case the student does not pass the subject in the current course, the scores obtained in laboratory, computer classroom and tutorials will be kept for a maximum of two courses.

To apply for an advance exam convocation the student should be aware that mandatory activities listed in this guide should be made.

REFERENCES

Basic

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Additional

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metals in arable and greenhouse soils of a Mediterranean environment region (Spain). Geoderma 200201, 180188.

ADDENDUM COVID-19

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

Como norma general, la modalidad de docencia se adaptaría a la situación sanitaria del momento y a lo que las autoridades sanitarias y académicas acuerden en este sentido.

1. Contenidos

Teoria: Se mantienen los contenidos inicialmente recogidos en la guía docente.

2. Volumen de trabajo y planificación temporal de la docencia

En los modos semipresencial y no presencial, la planificación temporal en la que se impartiría la docencia (teoría, laboratorio) se mantiene. En modo no presencial se dará flexibilidad al estudiante para la preparación de las lecciones no presenciales y las actividades propuestas.

La conversión del trabajo presencial a trabajo autónomo, y la conversión de las sesiones de laboratorio experimentales a otro tipo de actividades formativas que cubran las cuestiones clave, no afectará al volumen de trabajo total de la asignatura.

3. Metodología docente

La modalidad de la docencia se adaptaría a la situación sanitaria del momento.

Teoría: en el modo semipresencial, las sesiones de teoría se desarrollarán simultáneamente en aula y mediante streaming. En el modo no presencial, los contenidos de las sesiones de teoría se desarrollarán en sesiones no presenciales síncronas, asíncronas, o mediante presentaciones locutadas y/o con texto considerablemente enriquecido, que se pondrán a disposición de los estudiantes en el Aula Virtual. Las presentaciones incluirán numerosos links a publicaciones y videos de libre acceso, que permiten al estudiante ampliar los contenidos de las presentaciones y entender los conceptos expuestos.

Tutorías: en el modo no presencial, se propondrán cuestionarios online, ejercicios o actividades para su resolución práctica, de las que una parte se solicitará su entrega a través del Aula Virtual.

Aula de informática y laboratorio: en el modo semipresencial, los grupos se dividirán para reducir la ocupación del aula durante las sesiones prácticas. En el modo no presencial, se proporcionará un guion y/o vídeo asíncrono con las instrucciones de realización de una actividad equivalente junto con datos experimentales, sin descartar sesiones síncronas si fuera necesario. Con ello, los estudiantes elaborarán una memoria que entregarán mediante la opción “tarea” del Aula Virtual, para su posterior evaluación.

En todos los casos, las dudas y preguntas sobre las presentaciones se resolverán en Foros del Aula Virtual, o a través del correo electrónico.

4. Evaluación

En el caso de docencia semipresencial, se seguirá el modo de evaluación inicialmente previsto en la guía docente.

En caso de evaluación en modo no presencial, se modifica el peso de la evaluación final, compensado por un aumento del peso de la evaluación continua, el aula de informática y las tutorías, del siguiente modo:

1. Examen escrito final: 50%
2. Laboratorio: 25%
3. Aula de informática: 15%
4. Tutorías: 10%

De ser necesario un examen final no presencial, este consistiría en un examen único para las tres partes de la asignatura (atmósfera, aguas, suelos) que podría incluir cuestionarios online, pero también la realización de problemas a desarrollar en modo offline. Los cuestionarios se realizarán vía Aula Virtual. Los enunciados de los problemas se pondrán a disposición de los alumnos en el día y hora prevista para el examen, tras la realización de los cuestionarios online. El tiempo de realización del examen será proporcional a su extensión y dificultad. Antes de finalizar el tiempo, los alumnos proporcionaran una copia escaneada del examen escrito, a través de una tarea del Aula Virtual. En la copia también figurará la resolución de las cuestiones online que necesiten de cierto desarrollo. Solo se aceptarán archivos únicos en formato PDF. La hora de entrega será la que otorgue el sistema. El profesorado se reserva el derecho a aceptar exámenes entregados fuera de plazo.

Si un estudiante desea aparecer como “no presentado”, tan solo deberá ignorar la tarea de evaluación final programada.

Si alguien no dispone de los medios para establecer esta conexión y no puede realizar el examen final de este modo, deberá contactar con el profesorado por correo electrónico en tiempo suficiente antes de la realización del examen. Si este fuera el caso, se realizará una prueba alternativa, preferentemente de tipo ORAL.

Si durante la realización de la prueba final, un alumno perdiese conexión al aula virtual (sobrecarga, deficiente calidad, etc.) y no pudiese subir su examen, deberá enviarlo por medio del correo electrónico a los profesores encargados de cada parte, en el plazo establecido.

Cada estudiante debe ser responsable de salvaguardar durante un plazo de 3 meses el material original subido como Tarea a Aula Virtual (prueba escrita, vídeo, etc.), y proporcionarlo en caso de que le fuera posteriormente requerido.

Dado lo extraordinario del modo de docencia y evaluación no presencial, apelamos a la responsabilidad y a la ética de los/as estudiantes durante la realización de las pruebas. Si se detectara algún intento de copia u otro tipo de fraude, se adoptarán con rigor las medidas disciplinarias aplicables en estos casos.

5. Bibliografía

Para el estudio de la asignatura se recomienda el uso de las presentaciones, materiales escritos y vídeos disponibles en el aula virtual.

Se mantienen las referencias de la guía docente original que pueden ser consultadas online a través de la biblioteca de la UV. En el caso de que se considere necesario, se podrá ampliar con material adicional igualmente disponible para los alumnos.