Environmental Systems (250655)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA) Departament d'Enginyeria Química (EQ)
Credits	5.0 ECTS
Programs	MÀSTER UNIVERSITARI EN ENGINYERIA AMBIENTAL (pla 2014)
Course	2024/25

Main teaching language at each group

- Group 10ES1 Spanish (Q1)

Faculty

Responsible Faculty: Jaume Puigagut Juarez
Faculty: Joan De Pablo Ribas, Jaume Puigagut Juarez

Objectives of Education

CE01 - Apply scientific concepts to environmental problems and their correlation with technological concepts.
CE02 - Analyze systems, environmental problems and their resolution using models and evaluate them.
CE03 - Acquire basic skills of laboratory work and identify the methods and instrumentation for the determination of parameters relevant to the analysis of environmental problems.

Very aware of the structure of land, water and artificial ecosystems and their interactions.
Meet the ecology and the cycling of elements.
Meet the major environmental problems globally.
Analyzes energy bases, stoichiometric and kinetic of different processes.
Modeling process and quantifies the performance and efficiency of systems.
Determines the basis of environmental hazards to human health and ecosystems.
Apply material balances and energy to environmental problems.
Interprets water-rock and water - air interactions using thermodynamic and kinetic methods.
Meet the pollutants and identify their impact.
Learn the basics of how the atmosphere and applies them in maintaining air quality.
Learn the basics of climate and discusses the implications of current climate change.
Conceptualized an environmental problem described by equations and poses analytical or numerical solution.
Identifies the codes you need to solve a problem as conceptualized.
Recognizes the spatial and temporal scales required to resolve the problem.
Is familiar with solutions to problems relating to dynamical systems.
Learn about simple solutions to problems advection- dispersion - reaction.
Recognizes the existence of uncertainty in the parameters of the equations and is capable of performing an uncertainty analysis and sensitivity.
Learn methods for information and action on various parameters or variables.
Understand that any measure inherently carries an associated error and is able to work with them.
It is critical to the values reported by others when the measurement method is not specified.
He has worked in the laboratory measurement of some parameters of environmental interest.

Fundamentals of Ecology.
Characteristics of major ecosystems.
Biodiversity, bioaccumulation and bioaugmentation.

Biological and chemical processes in the environment.
Biogeochemical cycles (C, N, O, S, P).
Functioning of natural systems.
Toxicology and ecotoxicology.
System dynamics.

CE01 - Understand and develop ecological concepts from biological and chemical perspective. CE02 - Analyze systems, environmental problems and their resolution by models. CE03 - Develop basic skills of team work and oral presentations.
Know in depth the structure of terrestrial ecosystems, aquatic and their interactions from the point of view of ecology of populations and communities. Learn about the major environmental issues globally.
Fundamentals of ecology. Characteristics of the main ecosystems. Biodiversity. Biological and chemical processes in the environment. Biogeochemical cycles of major elements (C, N, P). Functioning of natural systems. Biomonitoring and dynamic systems.

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	25.5 h	56.67 %
	Medium group	9.75 h	21.67 %
	Laboratory classes	9.75 h	21.67 %
	Guided Activities	0.0 h	0.00 %
Self Study		80.0 h	

Contents

Biogeochemical cycles

Basic knowledge of the great cycles of terrestrial elements (carbon, nitrogen and phosphorus). It is essential to understand these cycles in order to understand the effect of man on the environment.
Calculation of carbon balances at global level

Specific Objectives

Understand the peculiarities of the great cycles of terrestrial elements (carbon, nitrogen and phosphorus)
Understanding numerically the effect of man on the carbon cycle (climate change)

Population ecology

Will the basic concepts to understand the ecological relationships between people and their environment. Activities will be complementary to the number of theoretical population ecology.

Specific Objectives

The student acquires the knowledge to understand the use of the people as a tool to determine the quality of environmental systems.
Having the numeric base to understand and quantify the effects of man on environmental systems.

Ecosystems

Ecosystems
Problem

Presentations

The students, from the material provided by the teacher, will describe a means of presenting work and what are the strategies that need to take the man to not exceed the biocapacity of its environment.

Specific Objectives

Take the conscience of man's effect on environmental systems and sustainability strategies which are desired.

Review

Activities

The ecological footprint (knowledge assessment)

We discuss the knowledge on the subject in relation to the theoretical concepts acquired during the course.

Dedication

1h

Oral presentation and report on environmental problem and its management / treatment

It will work in groups to defend a viable alternative on the treatment or management of an environmental problem chosen by the students.

Dedication

3h

Analysis of various environmental problems in a group

The teacher will provide the material so that the students, in a group, can defend a case study where a palliative procedure for a given environmental problem is established.

Dedication

3h

Review theoretical concepts

To test the theoretical knowledge acquired during the course

Dedication

3h

Teaching Methodology

The course is organized in sessions (3 hours/session). General estructure of each session is that of 2 hors theory + 1 hour numerical exercises (as long as the theory is enough to address the numerical exercises).

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

Grading Rules

(*) The evaluation calendar and grading rules will be approved before the start of the course.

The rating will be obtained from the continuous assessment marks and corresponding laboratory and / or computer room.

Continuous assessment will be based on the oral presentation and delivery of three jobs. This respresentarà 60% of the total course.

The evaluation of the knowledge imparted will be carried out by means of a multiple-choice test + problems. This respresentarà 40% of the total course.

Test Rules

The evaluated activities are compulsory. Not presenting any of the three activities will result in failing the course.

Office Hours

Fridays from 10h to 13h

Bibliography

Basic

- Piñol, J.; Martínez-Vilalta, J. Ecologia con números: una introducción a la ecología con problemas y ejercicios de simulación. Barcelona: Lynx, 2006. ISBN 8496553019.
- Margalef i López, R. Ecología. 5a ed. Barcelona: Planeta, 1992. ISBN 8432045802.
- Schlesinger, W.H. Biogeochemistry: an analysis of global change. 3rd ed. San Diego, Calif.: Academic Press, 2013. ISBN 9780123858740.