

Centre	University College of Engineering of Vitoria-Gasteiz
Name of subject	26096 – Characterisation of Pollutants
Qualification	Degree in Industrial Chemical Engineering
Type	Elective
Credits	6 ECTS
Year	4
Term(s)	1st
Department	Chemical and Environmental Engineering
Language	Spanish

Outcomes / Objectives

BRIEF DESCRIPTION OF CONTENT

Methodology for the characterisation of pollutants in the different environmental matrices. Main general analytical parameters for measuring water, air and soil pollution.

OBJECTIVES

To have knowledge of the methodological fundamentals of the analytical characterisation of the main pollutants and/or parameters for measuring environmental pollution in the different types of matrices: water, air and gaseous effluents and soil, solid waste and biological matrices:

- (a) sampling
- (b) techniques and analytical methods
- (c) quality control
- (d) expression of results

OUTCOMES

1. Be able to design sampling strategies to undertake simple environmental studies in the various environmental compartments.
2. Be able to evaluate different analytical method and sample pre-treatment options – according to the type of matrix and environmental study to be undertaken, and to select and provide reasons for selecting the most appropriate one(s) in each case.
3. Be able to use the necessary basic statistical tools to carry out quality control of the experimental data obtained in environmental studies.
4. Have knowledge of the methodology for properly carrying out the analytical characterisation of pollutants in different matrices and be able to use it to design simple protocols for carrying out environmental studies.
5. Be able to interpret new information related to the methodology for the analytical characterisation of pollutants in environmental studies.

Syllabus

Unit 1. Introduction to the environmental characterisation of pollutants.

Solid waste, wastewater and gaseous effluents from the main urban and industrial activities and their potential pollutants. Major issues in environmental analysis.

Unit 2. Analytical and sampling methodologies in environmental analysis.

Study of the sampling strategies and analytical methodologies (pre-treatments and analytical methods) most commonly used in environmental analysis.

Unit 3. Quality control of the analytical characterisation of pollutants in environmental studies. Statistical tools for the quality control of analytical results in environmental analysis.

Unit 4. Methodology for the characterisation of pollutants in environmental studies.

Description of the different stages of the protocol to be followed in an environmental study for properly carrying out the analytical characterisation of pollutants (bibliographical basis, sampling, analytical method, pre-treatments and quality control of the results).

Unit 5. Determination of the main general analytical parameters for measuring water pollution.

Major analytical parameters for measuring water quality, meaning and main methods of determination.

Unit 6. Determination of the main groups of air pollutants.

Analytical methodologies for the determination of the main groups of air pollutants.

Unit 7. Determination of the main groups of pollutants in soils and solid matrices. Major analytical parameters for measuring soil quality. Analytical methodologies for the determination of pollutants in soils and solid matrices.

Methodology

Teaching Method

Face-to-Face Teaching Hours

Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
36		6	18					

Student Hours of Non Face-To-Face Activities

Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
30			60					

Assessment System

General criteria

- Written essay exam
- Practical tasks (exercises, case studies or problems)
- Group assignments
- Presentation of assignments, reading...

Bibliography

Basic Bibliography

- APHA, AWWA & WPCF. "Métodos Normalizados para el Análisis de Aguas Potables y Residuales". Madrid. Ediciones Díaz de Santos, S.A., 2007.
- IHOBE - SOCIEDAD PÚBLICA DE GESTIÓN AMBIENTAL. "Guías Metodológicas de la Investigación de la Contaminación del Suelo". Bilbao. Departamento de Urbanismo, Vivienda y Medio Ambiente del Gobierno Vasco, 2004.
- LODGE J.P. JR. "Methods of Air Sampling and Analysis". Boca Ratón (Florida). Lewis Publishers, Inc., 1998.
- REEVE R.N. "Environmental Analysis". Chichester (England). John Wiley & Sons, 2004.
- RUMP H.H. y KRIST H. "Laboratory Manual for the Examination of Water, Waste Water and Soil". New York. VCH Publishers Inc., 2000.

In-depth Bibliography

- BARCELÓ D. Environmental Analysis. Techniques, Applications and Quality Assurance. Amsterdam: Elsevier Science Publishers B. V., 1996.
- DEAN J. Extraction Methods for Environmental Analysis. Chichester, West Sussex: John Wiley & Sons, 1998.
- KEITH L.H. Principles of Environmental Sampling. Washington DC: ACS Professional Reference Book, 1996.
- LATINI G. And PASSERINI G. Handling Missing Data: Applications to Environmental Analysis. Southampton: WIT Press, 2004
- SMITH K.A. and CRESSER M.S. Soil and Environmental Analysis: Modern Instrumental Techniques. New York: Marcel Dekker, 2004.

Magazines

- Analytica Chimica Acta. Elsevier. Elsevier.
- <http://www.sciencedirect.com/science/journal/00032670>
- Environmental Science and Technology. ACS.
- <http://pubs.acs.org/journals/esthag/index.html>
- Journal of Chromatography A. Elsevier.
- <http://www.sciencedirect.com/science/journal/00219673>

Websites

- USEPA. Environmental Test methods and Guidelines. EPA, 2006.
- <http://www.epa.gov/epahome/Standards.html>