

Course guide

33102 - MAARNMA - Analytical Methods Applied to the Study of Natural Resources and the Environment

Last modified: 04/05/2023

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.
Degree: MASTER'S DEGREE IN NATURAL RESOURCE ENGINEERING (Syllabus 2015). (Compulsory subject).
Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: CONCEPCION LAO LUQUE - MARIA PURA ALFONSO ABELLA

Others:

PRIOR SKILLS

1. Have the ability to analyse field and laboratory data and design experiments using computer methods.
2. Know the analytical techniques for the characterization of inorganic natural resources, as well as waste in the different states, know how to use them and interpret their results.
3. Capacity to use the scientific and technical information to respond efficiently to any demand of the preparation of an analytical method for the characterization of a natural or anthropogenic material.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Analyse field and laboratory data and design experiments following computer methods.
2. Know the analytical techniques for the characterization of inorganic natural resources, as well as waste in the different states, know how to use them and interpret their results.
3. Capacity to use the scientific and technical information to respond efficiently to any demand of the preparation of an analytical method for the characterization of a natural or anthropogenic material.

TEACHING METHODOLOGY

Attendance at scheduled lectures will be valued. The solutions to problems set during the course and the laboratory practices will be assessed. They will carry out a bibliographic research assignment related to the course content.

LEARNING OBJECTIVES OF THE SUBJECT

1. To become familiar with the main instrumental analytical techniques that are applied in environmental pollution control (analysis of water, wastes, soils and air): gas chromatography, high-performance liquid chromatography, mass spectrometry, inductively coupled plasma mass spectrometry, atomic absorption spectrometry and ultraviolet-visible spectroscopy. To learn the fundamentals of these techniques and some of their main applications.
2. To study systems for treating environmental samples.
3. To revise the parameters that determine the reliability of an instrumental method.
4. To apply the knowledge acquired in the laboratory practices.



STUDY LOAD

Type	Hours	Percentage
Hours medium group	15,0	33.33
Hours large group	30,0	66.67

Total learning time: 45 h

CONTENTS

DESCRIPTION OF THE LECTURES

Description:

1. Introduction to environmental measurements
2. Collection of environmental samples
3. Preparation of samples
4. Spectroscopic methods for environmental analysis
5. Chromatographic methods
6. Mass spectrometry: fundamentals and interpretation of spectra
7. Air analysis methods
8. Analytical methods of water
9. Analysis methods of solids
10. Study of the reliability of instrumental methods
11. Isotope geochemistry applied to the study of natural resources: general characteristics of isotopes
 - 11.1 Introduction
 - 11.2 Stable isotopes: principles of the isotopes of H, O, S, C and N
 - 11.3 Radiogenic isotopes: principles of Sr, Pb, U, ¹⁴C, tritium (³H)

Full-or-part-time: 45h

Theory classes: 30h

Practical classes: 15h

(ENG) -DESCRIPCIÓ PRÀCTIQUES

GRADING SYSTEM

30% attendance

30% reports on practicals

15% continuous assessment

25% exam

Compulsory reading list:

BIBLIOGRAPHY

Basic:

- Crompton, T. R. Analysis of solids in natural waters [on line]. Berlin: Springer-Verlag, 1996 [Consultation: 07/10/2022]. Available on : <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=6502613>. ISBN 3540601635.
- Fritz, James S. Analytical solid-phase extraction. New York: Wiley-VCH, 1999. ISBN 0471246670.
- Pawliszyn, J., ed. Applications of solid phase microextraction. Cambridge: Royal Society of Chemistry, 1999. ISBN 0854045252.
- Rubinson, Kenneth A.; Rubinson, Judith F. Análisis instrumental. Madrid: Prentice Hall, 2001. ISBN 8420529885.