Level: Master

Course title: Hyphenated techniques and their application to the analysis of the environment

Status: elective

ECTS: 7

Requirements: Passed exams Fundamentals of Quality Control and Quality Control of the Environment

Learning objectives

Introduce students to the current development of advanced hybrid technologies and their application to the analysis of a wide range of complex environmental samples.

Learning outcomes

After completing the course, student is able to (1) explain why certain hybrid techniques are the subject of considerable interest in the development of analytical methods, (2) state the limitations which must be overcome when coupling different combinations of instruments, and (3) demonstrate a wide knowledge of some hybrid techniques that are applied for the analysis of environmental samples.

Syllabus

Theoretical instruction

How to overcome limitations of conventional instrumental analysis using hybrid technology? Sample preparation techniques: solid phase extraction (SPE) and purge and trap. Separation techniques (GC and LC) and capillary electrophoresis (CE). Detection techniques: FTIR, NMR and MS, including comparison of TOF, sector (magnetic and electric), and quadrupole mass spectrometers. Problems related to connecting techniques: challenges and data processing. Applications: LC-ICP-MS for the speciation of Cr, As, etc. LC-NMR for the characterization of natural organic matter (POM), the determination of poly-hydrocarbons (PAHs) in soil and sediment, GC-FTIR testing of pesticide degradation; LC/TOF- MS for the analysis of new pollutants (emerging contaminants).

Practical instruction

Practical teaching follows theoretical lessons.

Weekly teaching load				Other:
Lectures: 1 (15)	Exercises: LV 3 (45)	Other forms of teaching: 1 (15)	Student research:	