



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Technologies for the Analysis of Contamination in the Marine Environment

2324-2-128R-TECH

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#### Title

Applied Analytical Chemistry in Marine Sciences

#### Teacher(s)

Francesco Saliu

#### Language

English

#### Short description

Chemical measurements in the marine environment are crucial for understanding the biogeochemical processes that shape the Earth's system and the survival of marine ecosystems, along with the associated ecosystem services. The chemical complexity of seawater and its interactions with the atmosphere, lithosphere, and biosphere present a range of analytical chemistry challenges. Seawater can be likened to an organic soup containing approximately 100  $\mu\text{M}$  of dissolved organic carbon, only a small fraction of which has been identified. The significant issues stem from the unique composition of seawater, the vast spatial and temporal scales over which

measurements need to be taken, and the extremely low concentrations of many organic and inorganic species of interest. Given that biogeochemical processes and the impact of human activities cannot be understood through isolated measurements, new technologies and sensor developments are rapidly emerging. This course aims to provide fundamental knowledge in marine analytical chemistry, covering the key steps of analytical method development from sampling to sample preparation and detection. It will address non-destructive techniques such as UV-VIS, IR, XRF, and Raman spectroscopy, as well as high-resolution hyphenated techniques like LC-MS and GC-MS, along with the latest advances in underwater analysis. The course will also include laboratory experience with infrared spectroscopy and mass spectrometry. Teaching will encompass lectures, exercises, laboratory sessions, fieldwork, and practicals, with oral and written presentations forming integral parts of the course. Special emphasis will be placed on marine pollution, aligning with The UN's Sustainable Development Goal target 14.1, which aims to "prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution" by 2025

### **CFU / Hours**

1CFU/8 hours

### **Teaching period**

Aprile - Maggio 2025

### **Sustainable Development Goals**

GOOD HEALTH AND WELL-BEING | CLIMATE ACTION | LIFE BELOW WATER

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