

# UE Analytical and spectroscopic methods



ECTS  
6 credits



Component  
UFR Chimie-  
Biologie



Semester  
Tous les ans

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** YACH7U11

## Presentation

### Description

The goal of this course is to give chemists a solid theoretical (through lectures) and practical (through tutorials) background and know how in chemical analysis. Building on previous introductory undergraduate classes, the course will study more specifically the diverse purification and separation chromatographic technics, and the methods used to characterize chemical samples by mass spectrometry, atomic absorption, optical spectroscopies (infrared, Raman, UV-visible, fluorescence, X-ray diffraction) and magnetic spectroscopies (NMR and EPR). The spectroscopic approaches will be developed for structural studies of isolated molecules in solution or in the solid state. Techniques used to characterize intermolecular interaction and molecular reactivity of organic, inorganic or polymer materials will also be investigated.

### Course parts

CMTD	Lectures (CM) & Teaching Unit (UE)	13,5h
CM	Lectures (CM)	12h

**Period :** Semester 7

### Skills

Skills at aim: Knowledge of the principles of the different separative methods and elaboration of protocols to analyze the composition of mixtures and their extraction. Understanding of the principles of fluorescence and analysis of fluorescence data

to retrieve structural information isolated molecules or complexes. Choice of adequate experimental conditions and parameters to collect quantitative NMR data on any nucleus and analysis of 2D NMR spectra to retrieve structural information on complex molecules.

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## Bibliography

Details:

I. Chromatography (4 lectures/3 tutorials)

- a. Phase separation : ultracentrifugation, distillation, electrophoresis
- b. Extraction: liquid/liquid, solid/solid, MIPS
- c. The different chromatographic methods and their parameters: GC, HPLC, reversephase,FPLC

II. Mass spectrometry (4 lectures / 2 tutorials)

- a. Sources : EI, CI, FAB, MALDI, ESI, ICP-MS
- b. Analyzers: quadrupoles, TOF
- c. MS-MS and fragmentation

III. Optical spectroscopy (4 lectures / 3 tutorials)

- a. Generation of electronic excited states and property of these states (life-time, emission, quantum yield...)
- b. Inhibition of excited states and electron transfer (Dexter and Forster transfers)

IV. Magnetic resonances (8 lectures / 6 tutorials)

## Useful info

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### Contacts

Program director

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### Place

› Grenoble

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### Campus

› Grenoble - University campus