

Spectroscopic techniques for the identification and quantitation of organic compounds in the agrifood field.

SSD: Chim/06

PHD COURSE: Food Science
ACADEMIC YEAR: 2024/2025

COURSE DESCRIPTION

TEACHER: Laura Grauso
PHONE: 081-2539468
EMAIL: laura.grauso@unina.it

GENERAL INFORMATION

SUGGESTED YEAR: I

PERIOD: from march to april

CFU: 4

EXPECTED OUTCOMES

The course will provide basic theoretical and practical information on the main spectroscopic techniques used for detection and quantitation of organic compounds with agricultural and food interest.

The student will gain a basic knowledge of the most common spectroscopic techniques, will be able to choose the most appropriate technique for a specific problem, and will be able to solve simple analytical problems in the agrifood field using spectroscopic techniques.

CONTENTS/SYLLABUS

1. Main extraction techniques of an organic material (plant, bacteria, food, fungi, etc)
2. Introduction of analytical separations. Basic principles of chromatography.
3. Introduction on spectroscopic techniques. Infrared (IR) spectroscopy. Basic theory. Vibrational frequencies of main functional groups. Applications of IR spectroscopy in the agrifood field.
4. Ultraviolet (UV) spectroscopy: Basic theory. Main chromophoric groups in organic compounds. Circular dichroism (CD) for the analysis of chiral compounds.
5. Mass spectrometry (MS). Basic theory. Ion Sources. Analyzers. High-resolution mass spectrometry. Tandem mass spectrometry (MS2). Instrumentation. Mechanisms of fragmentations and their structural meaning.
6. Hyphenated techniques: Gas chromatography coupled to mass spectrometry (GC-MS). Liquid chromatography coupled to mass spectrometry (LC-MS). Liquid chromatography coupled to ultraviolet

spectroscopy (HPLC-UV). Some applications in the agrifood field.

7. Nuclear magnetic resonance (NMR) spectroscopy. Basic theory. Nuclear Overhauser Effect (NOE). One- and two-dimensional NMR spectra. Application of 1D- and 2D-NMR in the agrifood field.

READINGS/BIBLIOGRAFY

Silverstein, Webster, Kiemle. Spectrometric Identification of Organic Compounds. Casa Editrice Ambrosiana. Randazzo. Guida Pratica alla Interpretazione di Spettri NMR. Loghia.

TEACHING METHODS

Lectures	hours: 20
Laboratory	hours: -
Seminars	hours: 4
Other activities	hours: 4 (tutorials and practical examples of interpretation of spectral data)

EVALUATION CRITERIA

a) Methods for acquiring eligibility

- Written exam
- Oral exam
- Project discussion
- Other

b) Evaluation pattern

For the eligibility, a percentage of the attendance at the course of at least 75 % is requested.