

# Spectroscopies moléculaires

## Lecturers

Jean VANDER AUWERA (Coordinator) and Pierre-François COHEUR

## Course mnemonic

CHIM-F325

## ECTS credits

5 credits

## Language(s) of instruction

French

## Course period

Second term

## Campus

Solbosch

## Course content

Properties of light; electrical properties of matter; matter-radiation interactions; rotational spectroscopy; infrared spectroscopy (vibration-rotation); spectra and line profiles; visible/ultraviolet spectroscopy (electronic transitions); Raman spectroscopy; spectroscopy in the presence of an external field; instrumental aspects.

## Objectives (and/or specific learning outcomes)

At the end of this teaching unit, the student will have acquired the basic knowledge required to understand and analyze molecular spectra, in particular in the gas phase. The student will master the interaction between molecular motions and an electromagnetic radiation.

## Pre-requisites and co-requisites

### Co-requisites courses

CHIM-F206 | Mécaniques classique et quantique | 10 crédits

### Required knowledge and skills

In addition to the pre-required teaching unit, the student must master the knowledge of first and second year in mathematics and physics.

## Teaching method and learning activities

On campus learning; lecture and practical work.

## Contribution to the teaching profile

Acquire, assimilate and exploit basic knowledge in mathematics, physics, chemistry, biology and earth sciences; Gather, analyze and synthesize knowledge; Use the precise and specific language, and the communication conventions of chemistry; Draw conclusions; Integrate experimental and theoretical reasoning; Solve problems; Design and write rigorously a meaningful document; Be able to summarize and synthesize; Learn to work and communicate as a team.

## References, bibliography and recommended reading

(1) "Physical Chemistry, a molecular approach", D.A. McQuarrie and J.D. Simon, University Science Books, Sausalito, California (1997), ISBN 0-935702-99-7, BST 541 M 242 p (2 exemplaires); (2) "Molecular spectroscopy", J.L. McHale, CRC Press, Taylor & Francis Group (2017), ISBN 978-1-4665-8658-1; (3) "Spectra of atoms and molecules", P.F. Bernath, Oxford University Press, New York, 2nd edition (2005), ISBN 0-19-517759-2, BST 543.085.8 B 457 s (1st ed.).

## Course notes

Syllabus and Université virtuelle

## Other information

### Place(s) of teaching

Solbosch

### Contact(s)

Jean VANDER AUWERA (jean.vander.auwera@ulb.be) ou Pierre COHEUR (pierre.coheur@ulb.be), Service Spectroscopy, Quantum Chemistry and Atmospheric Remote Sensing (SQUARES), C.P. 160/09, building D, level 7, Solbosch Campus. Communication between the teachers and the student relies mainly on e-mail ("ulb.be" addresses only).

## Evaluation method(s)

Other

### Evaluation method(s) (additional information)

Oral exam without preparation for the lecture and written report for the practical work.

### Determination of the mark (including the weighting of partial marks)

The mark is equal to 85% of the mark obtained by the student for the lecture and 15% of the mark obtained for the practical work; the success of the student depends on the attendance to the

practical work for the concerned teaching unit. A student absent from the practical work sessions will received a global mark of "absent" both for the first and second sessions.

### Main language(s) of evaluation

French

## Programmes

Programmes proposing this course at the faculty of Sciences

BA-CHIM | Bachelor in Chemistry | unit 3

