

Résonance magnétique nucléaire

Lecturer

Michel LUHMER (Coordinator)

Course mnemonic

CHIM-F457

ECTS credits

5 credits

Language(s) of instruction

French

Course period

Second term

Campuses

Solbosch and Plaine

Course content

Reminders and complements :

- Basics of solution-state NMR spectroscopy
- Interpretation of usual one-dimensional (1D) ^1H and ^{13}C spectra
- Interpretation of usual two-dimensional (2D) ^1H and ^{13}C spectra

Fourier transform NMR :

- Instrumentation and sample for solution-state measurements
- Introduction to the acquisition and processing of 1D NMR spectra
- Simple sequences with multiple impulsions :
 - Inversion-Recovery – T^1 Filter
 - Spin-Echo, CPMG – T^2 Filtre
 - TOSCY-1D

2D NMR complements**Introduction to the nuclear Overhauser effect (NOE)****Chemical Exchange**

- Lineshape analysis
- Incoherent longitudinal magnetization transfer experiments

Self-diffusion coefficient measurements**Interpretation of relaxation times**

Objectives (and/or specific learning outcomes)

Introduce students to :

- the principles of Fourier transform NMR spectroscopy, NMR data acquisition and processing;
- the determination of the molecular structure of (bio)organic compounds via high-resolution 1D and 2D NMR measurements;

- the thermodynamic and kinetic characterization of chemical equilibria;
- the characterization of translational and rotational dynamics of molecules.

Teaching method and learning activities

The course consists alternately of theory lessons and practice with correction and discussion of exercises.

References, bibliography and recommended reading

Claridge T.D.W.; High-Resolution NMR Techniques in Organic Chemistry, 1st ed. 1999 (ISBN 0080427987) or 2nd ed. 2008 (ISBN 0080548180).

Hore P.J.; Nuclear Magnetic Resonance, 1st ed. 1995 (ISBN 0198556829).

Kiemle D.J., Silverstein R.M., Webster F.X.; Identification spectrométrique de composés organiques, 2ème éd. 2007 (ISBN 2804155072).

Course notes

Université virtuelle

Other information

Place(s) of teaching

Solbosch and Plaine

Contact(s)

Prof. Michel Luhmer
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Evaluation method(s)

Other

Evaluation method(s) (additional information)

A : Open-book written examination (about 3h) - Exercise : determination of the molecular structure of an organic compound and assignment of the NMR signals.

B : Oral examination (about 45 min) : Questions of theory, which can be related to specific experimental observations.

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

Weighting of about 50% for parts A and B.

Main language(s) of evaluation

French

Other language(s) of evaluation, if applicable

English

Programmes

Programmes proposing this course at the faculty of Sciences

MA-CHIM | **Master in Chemistry** | finalité Research/unit 1, finalité Teaching/unit 1 and finalité Professional/unit 1

