UE Structure determination of biological macromolecules

ECTS
6 credits

Component
UFR Chimie-Biologie

> **Teaching language(s):** English

> **Open to exchange students:** Yes

> **Code d'export Apogée:** YACB9U35

Presentation

Description

The course will present practical and theoretical aspects of the classical approaches used to determine the structure of macromolecules by X-ray crystallography and Nuclear Magnetic Resonance spectroscopy. The program of this course is described below:

Part I - Crystallography - 20h

- Crystallization techniques
- Crystal symmetry and space groups
- Diffraction
- Structure factors, reciprocal space etc
- Tutorial: Data treatment
- Phasing – MIR, SAD, MAD
- Molecular replacement, crystallographic symmetry
- Tutorial: MAD Phasing
- Tutorial: Molecular replacement
- Refinement
- Tutorial: Model building and refinement
- Practical lab: Crystallization on a PSB platform

- Practical lab: X-ray data collection on a ESRF beamline

Part II – Nuclear Magnetic Resonance-20h

- NMR principles: active nuclei, magnetic field, radiofrequency excitation, return to equilibrium
- NMR observables in the spectra of biomolecules (chem. shift, scalar couplings, linewidth)
- NMR observables: measurement
- Practical lab on IBS-NMR platform: data collection
- The steps to structure determination: sample preparation, isotopic labeling
- The steps to structure determination: assignment
- The steps to structure determination: extraction of structural parameters
- Tutorial: Data analysis
- Structure calculation: principles
- Practical lab: Protein structure calculation

Course parts

UE Structure determination of biological macromolecules - CM	Lectures (CM)	19h
UE Structure determination of biological macromolecules - TD	Tutorials (TD)	12h
UE Structure determination of biological macromolecules - TP	Practical work (TP)	10h

Period : Semester 9

Skills

Decision making in structure determination of biomolecules, expertise in experimental structure determination by X-ray crystallography and liquid-state NMR spectroscopy, critical analysis of structural models at atomic resolution.

Useful info

Contacts

Program director

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Place

> Grenoble

Campus

> Grenoble - University campus