

Optical spectroscopic methods for biomolecule analysis

 **ECTS**
3 crédits **Composante**
UFR Chimie,
UFR des
Sciences
fondamentales
et biomédicales **Volume horaire**
24h **Période de
l'année**
Semestre 2

En bref

- **Langue(s) d'enseignement:** English
- **Forme d'enseignement :** Cours magistral
- **Ouvert aux étudiants en échange:** Non

Présentation

DESCRIPTION

Interactions between biomolecules (protein, DNA, etc.) play a fundamental role in signaling pathways that regulate numerous cell functions. Study of these interactions makes it possible to understand the biological mechanisms and the physiopathology of many human diseases (cancer, neuro-degenerative illnesses). Their understanding thus offers possibilities for therapeutic intervention, by developing interface inhibitors, often more specific than inhibitors of enzymatic activity. After defining the characteristics of interactions between biomolecules (thermodynamic, kinetic, etc.) by presenting the structural and functional properties of these interfaces, we shall study physicochemical and analytical methods and techniques to detect these interactions, such as: Surface Plasmon Resonance imaging (SPRi), Fluorescence, Raman, Infrared (IR) and Circular Dichroism (CD) spectroscopies. This course will primarily

focus on the analysis of biomolecules and their interactions, building on the fundamental spectroscopic techniques taught in the first semester's 'Molecule and Surface Characterization I' module. We will illustrate the different parts of the lecture with various examples, and with article presentations performed by the students.

Content:

- Thermodynamic and kinetic aspects of biomolecule interactions.
- IR spectroscopy for biomolecule analysis: IR signatures of biomolecules, analysis of protein secondary structure and flexibility. Difference IR spectroscopy: principle and examples of application, nano-IR spectroscopy and imaging.
- Circular dichroism (CD): UV-Vis signatures of biomolecules, definition and principle of CD, applications of CD to biomolecules and limitations.
- Fluorescence emission spectroscopy and microscopy for biomolecule analysis.
- Surface Plasmon Resonance (SPR): basics on surface plasmon propagation, excitation conditions, principle of the SPR technique, instrumentation.
- SPR imaging (SPRi) for biomolecule interactions.
- Raman spectroscopy: application for biomolecule analysis.

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- Comparison of the various techniques.

HEURES D'ENSEIGNEMENT

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En bref

CONTACTS

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