Molecules, materials and living systems: a multidisciplinary approach

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Introduction

This course, offered to the students of the Doctoral School of Fundamental Sciences, will provide a contemporary presentation of some of the most active research fields in molecular and materials sciences connected to the life sciences. This strong connection with living systems contributes to fundamental advances of Science and to highly important applications from the economical and social points of view.

Audience

The lectures will be designed to be accessible to *non-chemists* (PhD students from all areas of fundamental science) and complementary for *chemists* while contributing to the build-up of the general scientific knowledge of both audiences. The important contribution of other sciences (physics, informatics...) in these multidisciplinary research fields will be highlighted.

Objectives & skills

After having attended this course, the students should have:

- acquired elements of general scientific knowledge
- been introduced to advanced topics in each of the specialized lectures. Such topics may be useful for their doctoral and future research activities
- understood the richness of the connection between molecules and materials within the life sciences.
- understood the complementarity between the "chemistry for biology" and "bioinspired" approaches. These topics will be presented as a guiding thread throughout the course.

The students will be invited to provide feedback on this course to check whether these objectives have been reached. The lectures will be improved in the following years according to their comments.

Organization

Lecturers

A team of trainers/lecturers has been gathered among highly motivated researchers from the "Chemistry for life sciences" thematic field of the Institute of Chemistry of Clermont-Ferrand (UBP CNRS ENSCCF) : S. Ducki (ENSCCF), V. Prévot (CNRS), S. Faure (CNRS), A. Gautier (CNRS), J.-M. Nédelec (ENSCCF), F. Cisnetti (UBP).. While sharing a common scientific culture at the chemistry/life sciences interface, these researchers possess different backgrounds. This team is indeed representative of the diversity of research areas that will be discussed.

Program and schedule

The series of lectures will begin with an introductory session intended to provide the basic knowledge required for the course (1 h). Then, selected topics will be addressed in 2h- or 3h-lectures. All lectures will be constructed to allow questions by the students to be addressed.

11/05/2015 8:30-9:30 Introduction	Federico Cisnetti (Asst. Prof., UBP)	-short history of chemistry applied to living systems -Life's (Macro)molecules
11/05/2015 9:30-12:30 Drug Design	Sylvie Ducki (Prof., ENSCCF)	- Drug discovery and development - From living systems to marketed drugs
11/05/2015 14:00-16:00 Molecular Bioinorganics	Federico Cisnetti (Asst. Prof., UBP)	- Fundamentals of bioinorganic chemistry - Metals in living systems - Metallodrugs
12/05/2014 9:30-11:30 Bionanocomposites	Vanessa Prévot (Researcher, CNRS)	- Immobilization of biomolecules and active ingredients on support -fields of application
12/05/2015 14:00-17:00 Biomaterials	Jean-Marie Nedelec (Prof., ENSCCF)	- Bioceramics - Composites - Implants / Tissue Engineering
13/05/2015 9:30-11:30 Click Chemistry and organocatalysis	Arnaud Gautier (Researcher, CNRS)	- From basic synthesis to drug discovery - Organocatalysis inspired from a natural enzyme.
13/05/2015 14:00-16:00 Foldamers	Sophie Faure (Researcher, CNRS)	- Artificial folded molecular architectures - Biomolecules mimetics