EPFL

CH-727   **Biomimetic membrane systems and their applications**

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Cursus	Sem.	Type
Chemistry and Chemical Engineering		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Oral
Workload	60h
Hours	**28**
Courses	24
Exercises	4
Number of positions	

Frequency

Every 2 years

Remark

Next time: Spring semester 2019

Summary

The course aims at showing how diverse model membrane systems are or could be applied in technology and in biology.

Content

1. Introduction to the structure and functions of cell membranes. Presentation of various biomimetic membrane systems.
2. Supported lipid bilayers (on hard, soft, porous, planar, curved, patterned substrates) and their interactions with cells. Applications in biosensors and in biocompatible materials.
3. Lipid vesicles (free-standing, tethered to a surface, or arranged in a network). Applications in drug delivery systems and in nanocontainers.
4. More exotic forms: lipid nanotubes, nanodisks and bicelles.
5. Steps towards a minimal cell: giant unilamellar vesicles supplemented with individual functions provided by the addition of cytoplasm, cytoskeleton, genome, and energy. Applications in biotechnology.
Cell membranes carry out many vital functions and have evolved to highly complex mixtures of lipids and proteins. Biomimetic membrane systems based on the essential lipid bilayer with embedded proteins provide a way to select (and to mimic) some structural or functional features of the cell membrane. Complex functions such as activation of immune cells, membrane fusion, cell adhesion and division have been studied with simpler and more controlled model membrane systems.
The course aims at showing how diverse model membrane systems are or could be applied in technology and in biology.The active participation of the students will be required for a multifaceted approach of a selected application.

Note

Next session Spring semester 2017

Keywords

Model membrane systems, supported lipid bilayers, vesicles, ion channel biosensors, drug delivery, minimal cells

Learning Prerequisites

Important concepts to start the course

Model membrane systems, supported lipid bilayers, vesicles, ion channel biosensors, drug delivery, minimal cells