

PHYS-441

**Statistical physics of biomacromolecules**

De Los Rios Paolo

Cursus	Sem.	Type
Ing.-phys	MA1, MA3	Opt.
Life Sciences Engineering	MA1, MA3	Opt.
Physicien	MA1, MA3	Opt.
Physics of living systems minor	H	Opt.
Physics		Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Oral
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Lecture	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

Introduction to the application of the notions and methods of theoretical physics to problems in biology.

**Content**

- 1. Introduction to polymer theory:** on and off-lattice polymers; statistical properties; exact, numerical and approximate results; correlation length; self-avoidance.
- 2. Interacting polymers:** experiments and models; analytical and numerical solutions of the models; phase diagram.
- 3. Proteins:** their role in biology; basic components; experimental results; models; analytical and numerical results.
- 4. Molecular Binding:** Derivation of basic rules. Equilibrium and non-equilibrium binding.
- 5. Molecular Motors: how to use energy for directed motion.**

**Learning Prerequisites****Recommended courses**

Course of Statistical Physics

**Learning Outcomes**

By the end of the course, the student must be able to:

- Solve problems in polymers statistical physics

**Transversal skills**

- Assess one's own level of skill acquisition, and plan their on-going learning goals.

**Teaching methods**

Ex cathedra. Exercises in class

**Assessment methods**

oral

**Resources**

**Moodle Link**

- <https://go.epfl.ch/PHYS-441>