



Specialty CELL PHYSICS

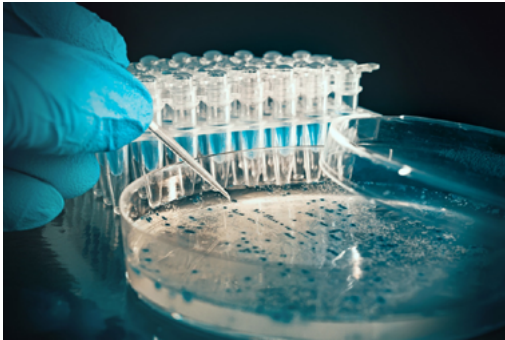
An integrated program with physicists, biologists, chemists, mathematicians.

Presentation:

Objectives of this year program are to train students in physics, biology, chemistry, and maths, with practicals. The focus is targeted on biological functions and translations between scientific fields.

Topics: Systems biology, Cell physics, Developmental biology, Statistical mechanics, Collective effects, Experimental physics, Chemical biology.

Practicals: Molecular biology, Cell biology, Developmental biology, Numerical simulations, Machine shop, Microfabrication and microfluidics, Electronics, Imaging.



Practicals for the design of key experiments in Cell physics.

Access and recruitment:

- ◆ **Entry level:** academic files and interview; eligible through master I or equivalent diploma.
- ◆ **Duration of training:** 2 years.
- ◆ **Enrollment procedure:** <https://ecandidat.unistra.fr> or Campus France.



Targeted skills:

Students who will graduate from this program will have a deep understanding of living matter and its complexity. With basics at the beginning of the year in biology, physics, maths, chemistry, and the students from any scientific backgrounds will be prepared to follow lectures by 20 lecturers from Europe in this integrated course. Each week, a master meeting will allow to debate ideas in lectures and in the field. Introductions to scientific writing and patents will be given throughout the year.

Job opportunities:

This program prepares for doctoral studies in France and abroad. It leads to jobs in the public and private sectors (scientists, engineers, lecturers, project managers, journalists).



Electronics and systems biology studies identify functions in biological networks.

Cell physics

Subjects taught:

M1: (common to all specialties, taught in English)



Semestre 1

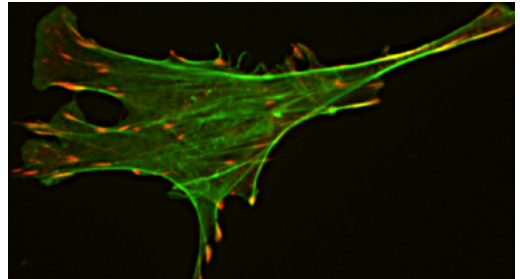
- Quantum mechanics and statistical mechanics (112h).
- Programming and actual research (58h).
- Experimental physics (60h).
- 1 free UE + 2 optional courses (56h): Mechanics of continuous medias (*in French*), Astrophysical objects and their observations, Group theory, Ionizing radiation and detection methods, General relativity, Direction of time & Advanced statistical mechanics, Variational principles and analytical mechanics, Elements of quantum theory of collisions, Project, Photonics for quantum science and technology, Soft condensed matter.

Semestre 2

- Nuclear physics and elementary particles-Solid state physics (112h).
- Computer programming and numerical simulations (22h).
- Laboratory physics (16 days).
- 1 free UE + 1 optional course (56h): Particles and astroparticles, Stellar physics, Atomic and molecular physics, Intro. to physics of living systems, Relativistic quantum mechanics, Numerical methods in physics, Project, Electronics for quantum science and technology, Critical phenomena and non-equilibrium statistical physics.

M2:

- Basics in Physics/Biology/Maths/Chemistry are given in September.
- Then students follow lectures in Physics of living matter (60h), Systems biology and classics in cell physics (60h), Chemistry for grafting and screens (20h), Maths for biology (20h) until February.
- The lectures gather and bridge formalisms and experiments for active gels dynamics, tissue rheology, origin of life, force measurements, collective effects and Navier-Stokes equation, systems biology.



The actomyosin cytoskeleton (in green) allows the cell to adapt its shape to the local environment.

Laboratory internship:

Internships start in March and typically 80 offers are received for about 10 students accepted in the Cell physics master.

Management Board:

D. Riveline, Physics, Strasbourg
J. Schacherer, Biology, Strasbourg.
N. Giuseppone, Chemistry, Strasbourg.
L. Navoret, Maths, Strasbourg.

Partnership:

In association with Ecoles universitaires de Recherche and Scientific departments of Unistra, TPS/ESBS.

Contacts / information:

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