The bricks of life

ECTS credits
5 credits

Semester
Spring

In brief

Course langage: English

Presentation

Prerequisites

First year Common Core courses and first semester of the second year at École Centrale Méditerranée

Learning objectives

The complexity of living matter emerges from its multi-scale organization and it is the purpose of this Teaching Unit to give a global vision. A multidisciplinary approach is essential to achieve this. To approach the study of an object, a material, a system, with the vision of different disciplines shows the interest of a multidisciplinary training for the new scientific, technological and societal challenges.

Description of the programme

The object of this Teaching Unit is the biological material in a multi-scale vision, from the nano-molecular and cellular scale to the human scale, passing through the mesoscopic scale of the circulation of biofluids and macroscopic tissues. It is divided into four parts:
"Basic bricks" which describes living matter at the molecular and cellular scale;
"Soft matter and microfluidics" which integrates molecular organization in a statistical thermodynamics approach leading to a description of mean field and finally of continuous material medium;
"Tissue modeling" integrates structural data of tissues from the microscopic to the human scale, in a description of biomechanics of continuous media;

Detailed content of the courses in the online documentation on the school's website (in French and English).

Generic central skills and knowledge targeted in the discipline

The disciplines involved are chemistry, physics, mechanics, and mathematical and numerical modeling. This teaching complements the other courses on the structure of matter and its behavior. Living matter is widely recognized today as a promising source of inspiration. We generally speak of bio-mimicry or bio-inspired materials.

How knowledge is tested

CC in each of the four parts, counting equally for the grade of the UE.

Bibliography

Alberts, A. D. Johnson, J. Lewis, D. Morgan, M. Raff, K. Roberts, P. Walter, Molecular Biology of the Cell, Garland Science, 2015.
J. N. Israelachvili, Intermolecular and interface forces, Academic press, 2011.
S. C. Cowin, Tissue mechanics, Springer, 2007.
A. I. Kapandji, Anatomie fonctionnelle, Maloine, 2018.

Teaching team

- Karine ALVAREZ
- Stéphane BETZI
- Stéphane CANAAN
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- Alexandre MARTINEZ
- Thien VU MANH
- Marc JAEGER
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Sustainable Development Goal



Access to health



Quality education



Life below water



Life on land

Total des heures **58h**

CM	Master class	50h
TP	Practical work	8h

Useful info

Name responsible for EU

Lead Instructor
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