

UE Physics of biological systems



Level
Baccalaureate
+5



ECTS
3 credits



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX7NFAF/PAX9MCAJ

Presentation

Description

Introduction to biology (components and structure of the cells, genetic information, metabolism, regulation of gene expression), stochastic processes and diffusion in biological systems (with applications in population mobility patterns or in molecular motor processes), introduction to evolution (historical perspectives, the modern synthesis, genetic drifts), genetic circuits (transcription regulation, genetic logic gates, oscillatory or bistable circuits, synthetic biology), optimality in biological systems (evolution of genetic circuits, cost-benefit issues, game theory in evolving biological systems).

After each chapter, the newly introduced concepts will be illustrated through the analysis and discussion of scientific articles, either by the teacher or by the students. Each student will be required to present at least one article to the group during the overall lectures.

Course parts

UE Physics of biological systems - CMTD

Lectures (CM) & Teaching Unit (UE)

22,5h

Recommended prerequisites

Common knowledge in physics (mechanics, thermodynamics, statistical physics,...) and mathematics (dynamical systems, differential equations,...).

Period : Semester 9

Skills

Fundamental knowledge on biological systems and on physical and quantitative approaches in biology, current physics-oriented models and scientific questions relative to biological systems.

Bibliography

Fundamentals of biology: Bruce Alberts, "Molecular biology of the cell"; David L. Nelson and Michael M. Cox, "Lehninger Principles of Biochemistry"

Biological physics: Philip Nelson, "Biological Physics: Energy, Information, Life"; Rob Philips, "Physical biology of the cell"

Systems biology: Uri Alon, "An introduction to Systems Biology"; Eberhard O Voit, "A first course in Systems Biology"

Useful info

Place

> Grenoble

Campus

> Grenoble - Scientific Polygon