

Cellular Economics

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Course organization:

The course module is organized in 15h of lectures and 10h of tutorials to introduce knowledge and methodological tools.

Targeted learning objectives:

In recent years the dynamics of biological systems has been increasingly described using concepts and terminology borrowed from economics: cells face trade-offs between different strategies for survival; metabolism can be viewed as a resource allocation problem; biomolecules can be associated with a “value” within the free energy “market” of the cell, etc. These concepts indicate the emergence of a new way of thinking about problems in biology.

In this course, we will explore biological questions that can be addressed using concepts of resource allocation, efficiency and optimality on (1) genome-scale cellular metabolism, (2) gene expression and protein synthesis, (3) cellular fitness and (4) game theory in cellular and multicellular biology.

At the end of the course, students will be able to:

- Explain the principles of cellular economics and resource allocation in living systems
- Analyse simple growth strategies of living systems in a competitive environment
- Describe simple models and identify their advantages and limitations.