

FDITE72 Bioenergetics

(L. Zimányi)

Description:

The course discusses membrane and molecular bioenergetics. Bioenergetics is a branch of science that combines the methods and results of biophysics, biochemistry, and cell physiology, and examines the chemical processes that provide energy to living cells.

Topics:

Phenomenological thermodynamics

Chemical thermodynamics, forms of free enthalpy. Solvation of charges

Reaction kinetics and thermodynamics. Transition state, potential barriers

Mitchell's chemiosmotic theory. The proton circuit

Respiratory electron transport and proton transport

Theory of long-range electron transfer, Marcus theory

Intraprotein proton transport, the photocycle of bacteriorhodopsin

Proteins and complexes performing respiratory electron and proton transfer

Photosynthetic electron transfer. Light energy utilization

ATP synthesis. Structure and function of F₁F_o-ATPase

Active and passive ion transport across membranes. Coupled mass transport

Mechanical work. Molecular motors

Physiological role of mitochondria

Recommended literature:

Nicholls D.G., Ferguson S: Bioenergetics: Fourth Edition, Oxford University Press, 2013.