

CELLULAR BIOPHYSICS

(5 ECTS, 2nd semester)

Contents:

1. SELF-ORGANIZATION IN BIOLOGICAL PROCESSES (6h, Dr. J. Casademunt)
 - a. Self-assembly and self-organization. Active systems
 - b. Pattern formation. Turing mechanism
 - c. Excitability. Cardiac dynamics
2. MEMBRANES (16h, Dr. A. Hernández Machado)
 - a. Membrane physics
 - b. Biological membranes. Rafts. Active transport
 - c. Morphology and biological function. Vesiculation and tubulation
3. CYTOSKELETON AND CELL MECHANICS (10h, Dr. J. Casademunt)
 - a. Structure and physics of the cytoskeleton. Continuum description
 - b. Intracellular traffic
 - c. Mechanics of cell division
4. CELL MOTILITY (10h, Dr. J. Casademunt)
 - a. Hydrodynamics of cell movements
 - b. Cilia and flagella
 - c. Actin-based motility

Bibliography:

- Rob Phillips, Jane Kondev, Julie Theriot, *Physical biology of the cell*, Garland Science (2009).
- Dennis Bray, *Cell Movements: From Molecules to Motility*, Garland Publishing (1992).
- Jonhathon Howard, *Mechanics of Motor Proteins and the Cytoskeleton*, Sinauer (2001).
- Ral Jones, *Soft Condensed Matter*, Oxford University Press (2002).
- Philip Nelson, *Física Biológica*, Reverte (2005).
- David Boal, *Mechanics of the Cell*, Cambridge University Press.
- Alberts et al. *Molecular biology of the cell*, Garland Science (2002) 4th Edition.