# Elements of Biophysics

(4 CFU - 32 hours)

Master in Bioinformatics - University of Bologna

1st Year - First Semester

Course Director: Prof. Emidio Capriotti
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Week 1: October 13-21, 2025

| | | |
|---|---|---|
| 13/10 | Monday | 14:00 - 17:00 |
| 14/10 | Tuesday | 14:00 - 17:00 |
| 15/10 | Wednesday | 14:00 - 18:00 |
| 16/10 | Thursday | 14:00 - 17:00 |
| 17/10 | Friday | 14:00 - 17:00 |

Week 2: October 21-27, 2025

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|---|---|---|
| 20/10 | Monday | 14:00 - 17:00 |
| 21/10 | Tuesday | 14:00 - 17:00 |
| 22/10 | Wednesday | 14:00 - 18:00 |
| 23/10 | Thursday | 14:00 - 17:00 |
| 24/10 | Friday | 14:00 - 17:00 |

# 68469 - Elements of Biophysics

**Learning outcomes**
At the end of the course, the student acquires the basic elements of biomolecular structure and function and the most appropriate models for their descriptions. In particular, the student acquires skills concerning: - Basic elements of cell biology; - Basic elements of structural and functional biology; - Basic notions of kinetics and thermodynamics for modelling relevant biological functions.

**Course contents**
- Thermodynamics Principles, State Variables and Spontaneous Processes.
- Transition Phase, Mixtures, Osmosis. Equilibrium Constant and Chemical Potential.
- Reaction Kinetics, Activation Energy, Enzymes and Michaelis-Menten Mechanism
- Proteins, Amino Acid Properties, Electronegativity and Chemical Bonds
- Protein Structure, Stabilizing interactions, Hydrophobic Effect and Protein-Protein Interactions
- Experimental techniques for structural determination: X-ray and NMR.
- Biological Systems: Signal transduction, Rhodopsin, Protein Sequence and Structure Comparison and Functional Genomics.

**Readings/Bibliography**
Suggested readings, and material online.
- Biophysics: An Introduction (2° Edition). by Roland Glaser, Springer.
- Biophysical Chemistry by James P. Allen, Wiley.
- Molecular and Cellular Biophysics by Meyer B. Jackson, Cambridge University Press.

**Teaching methods**
Lectures, exercises.

**Assessment methods**
The assessment based on a project report and an oral exam. The aim is to evaluate the student's understanding of the learning outcomes of the course, focusing on the major aspects of the biological complexity.

**Teaching tools**
Online