



## Schedule of the course

Degree L/LM/LMCU	Degree in Biotechnology
Name of the course:	Physical Chemistry
Number of credits:	6
Semester:	First semester of the second year
Teacher Professor:	Prof. Giuseppe Graziano
PhD students/fellows carrying out teaching activities in support of the course	none
Reception hours:	Wednesday 15-17
Indirizzo:	

### PRESENTATION OF THE COURSE:

The Physical Chemistry course provides the basic elements of chemical thermodynamics with a macroscopic and molecular approach as well as quantum-mechanics and spectroscopy that should enable the student to acquire basic knowledge for a successful continuation of his / her study path.

### LEARNING OBJECTIVES

The student who passes the examination of physical chemistry should know the fundamental aspects of macroscopic and microscopic thermodynamics and use them for an increasingly molecular understanding of the biological processes that will be studied in subsequent courses. In particular, it should have understood the relationship between degrees of freedom of a molecular system, quantized energy levels, thermal capacity, and absorption-emission of electromagnetic radiation. This knowledge baggage should improve its self-learning skills and scientific communication.

### PREREQUISITES

It is strongly recommended that student passes the exams of General and Inorganic Chemistry, Organic Chemistry and Physics with Laboratory.

### COURSE ATTENDANCE

Class attendance, although not mandatory according to the University Teaching Regulations, is strongly recommended because the content of the course does not correspond to any existing text and the teacher's explanations are fundamental.

## CONTENTS OF THE COURSE

Classical thermodynamics: I, II and III laws and phase transitions. Statistical thermodynamics: Boltzmann distribution and entropy. Structure and conformational stability of globular proteins. Chemical equilibrium: pressure and temperature dependence; MWC and KNF models for oxygen binding on Mb and Hb. Light-matter interaction. IR spectra.

## DIDACTIC METHODS

The course consists of frontal lessons, with the resolution of some numerical exercises considered to be of particular interest, and of some exercises with PC. This choice is dictated by the need to explain and transfer non-immediate learning content.

## REFERENCE TEXTBOOKS

Physical Chemistry - Atkins and Paula, Zanichelli.

Physical Chemistry: Principles and Applications in Biological Sciences - Tinoco, Sauer & Wang, 4th edition, Prentice Hall.

Class notes.

## EXAM

The exam consists of a written test of 1.5 hours with open response questions and a subsequent oral exam. The evaluation of the written test takes into account in particular the correctness of the answers and the form in which they are written in Italian language. The evaluation of the oral test takes into account the correctness of the answers to the questions, the ability to connect different parts of the program, the technical language property, and the overall expressive capacity of the student.

## EXAM CALENDAR

Refer to the link

## EXAM BOOKING

Refer to the link

## SYLLABUS

Topics	Hours	References	Lesson type
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Classical thermodynamics	6		Frontal lesson
Statistical thermodynamics	6		Frontal lesson
Structure and stability of globular proteins	10		Frontal lesson
Chemical equilibrium, osmosis and dialysis	6		Frontal lesson
Oxygen binding on Mb and Hb	4		Frontal lesson
Diffusion and random walk	4		Frontal lesson
Electromagnetic radiation and quantum mechanics	6		Frontal lesson
IR spectra and principles of LASER	6		Frontal lesson