



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Chimica Fisica Ambientale

2021-2-F7501Q051

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#### Aims

To treat the main physical-chemical aspects related to the equilibrium distribution of compounds in various environmental compartments and extend the thermodynamic discussion to the study of non-equilibrium systems, in order to use the knowledge gained for the treatment of environmental systems.

Laboratory experiences will integrate the arguments discussed during the course.

#### Knowledge and understanding

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#### Applying knowledge and understanding

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#### Making judgements

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#### Communication skills

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## Learning skills

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## Contents

Partitioning equilibria; Environmental thermodynamics; Transport processes

## Detailed program

Thermodynamics aspects of partitioning processes. Real systems: fugacity and activity coefficients. Partitioning processes: vapour and liquid-gas distribution. Activity coefficients and solubility in water. Partitioning of compounds between different environmental compartments and phases.

Transport processes

Thermodynamics of non-equilibrium systems. Thermodynamic equilibrium and stability criteria. Non-equilibrium systems: the linear regime and the stationary states. Criteria for stability of stationary states. Systems far from equilibrium and stability criteria. Dissipative structures

## Prerequisites

Thermodynamic of equilibrium systems

## Teaching form

**During the Covid-19 emergency period, the lessons will take place remotely asynchronously (videotape posted on the e-learning platform of the Course) with synchronous videoconferencing events.**

**The laboratory activities will be carried out partly in presence, in small groups, and partly will be carried out remotely, taking advantage of video recordings of the experiences and developing the processing of data in small groups.**

The course includes 4 CFU (28 hours) of lectures and 2 CFU (24 hours) in the laboratory.

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## Textbook and teaching resource

Lecture notes of the teacher: U. Cosentino, Chimica Fisica Ambientale

Suggested textbooks

P.W. Atkins, J. de Paula Physical Chemistry, 9a edition, 2011, Oxford University Press

Rene P. Schwarzenbach, R.P. Gschwend P.M., Imboden D.M., Environmental Organic Chemistry – 2003, second edition, Wiley

D. K. Kondepudi, I. Prigogine Modern Thermodynamics: From Heat Engines to Dissipative Structures, John Wiley & Sons Inc, 1998.

## Semester

First semester

## Assessment method

The exam consists of:  
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The final grade, expressed in thirtieths with possible praise, is given by the average of the two tests.

**The oral interview, in the permanence of the COVID-19 emergency, will be carried out by telematic mode.**

At the request of the student, the exam can be conducted in English.

## Office hours

Every day, by appointment.

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