

## Faculty of Biological, Agronomic and Environmental Engineering



### BIR1314 Physical chemistry I

[30h+30h exercises] 4.5 credits

This course is taught in the 2nd semester

**Teacher(s):** Eric Gaigneaux, Daniel Peeters  
**Language:** French  
**Level:** First cycle

#### Aims

Acquiring knowledge on the properties of matter at microscopic level (corpuscles, atoms, molecules) Know-how in physical chemistry : quantification, conceptualisation and modelisation in relation to experiment (spectroscopy)

#### Main themes

Quantum mechanics of atoms and molecules : Introduction to the formalism of quantum mechanics, to atomic and molecular structures, and to the nature of the chemical bond. Spectroscopy : basic principles and study of various main types of spectroscopies in relation to chemistry.

#### Content and teaching methods

Introduction to quantum mechanics (22.5 h) : the equation of Schroedinger and its resolution to particules in potential wells (vox, oscillator, rotator and hydrogen-like atoms). Extension to atoms, hydrogen ion molécules, diatomics and polyatomic molecules. Special attention being paid onto molecular motions and onto to chemical bond. Exercices are organized in computer room to handle these concepts.

Spectroscopy (7.5 h) : distinctions between spectroscopy and spectrometry, emission and absorption, rotational, vibrational and libration spectroscopies with special emphasis on the principles, differences and complementarity of IR and Raman vibrational spectroscopies, electron spectroscopy with special attention on the difference between UV-Vis spectroscopy and photoelectron spectroscopy, principles of resonance spectroscopies (ESR and RMN). Exercices are organized with the objectives to acquire the ability to distinguish and handle spectra from different spectroscopies and to retrieve information from them related to the analyse samples.

#### Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Precursory courses General Chemistry, Physics and Mathematics  
 Evaluation Written  
 Support Notes and Reference Books

#### Programmes in which this activity is taught

**BIR2** Bio-ingénieur

#### Other credits in programs

<b>BIR21/C</b>	Première année du programme conduisant au grade de bio-ingénieur (Chimie)	(4.5 credits)	Mandatory
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