

The banner features a blue background on the left with the text 'Faculty of Sciences' in white. The right side shows a close-up of a person's face in profile, wearing glasses and looking at a chalkboard. The chalkboard has white chalk drawings of a cell and the name 'F. Vest' written on it.

Faculty of Sciences

BIO1321 Molecular genetics

[30h+10h exercises] 3 credits

This course is not taught in 2005-2006

This course is taught in the 1st semester

Language: French

Level: First cycle

Aims

The formation aims to give deepened knowledge in fundamental mechanisms that allow the treatment of genetic information (organisation, replication and expression) in relation to the physiology of the cells and organisms. This knowledge is built by integrating general notions of biochemistry and cellular biology to general concepts like the requirement for "cognitive" interactions between bio-molecules, the co-ordination of complex reactions within molecular machines, the coupling of separate biological processes inside defined cellular entities, etc. These different aspects are covered under the evolutionary angle, comparing strategies developed by prokaryotes and eukaryotes. Specific questions are discussed further, by describing methodological aspects. During tutorials, the student will be asked to personally participate to the formation by practising his/her ability to find, analyse and communicate recent information from the literature.

Main themes

After a general introduction replacing molecular genetics in its pluridisciplinary and methodological context, the themes covered in the formation include different levels of genetic information treatment in time and space.

- Evolutionary origin of the genome, its current structure and organisation in prokaryotes and eukaryotes. Concepts of chromosomes, chromatin, topology and compaction of DNA.
- Replication, maintenance and modification of the genetic material. Assembly and function of the replisome, co-ordination between DNA synthesis and reparation, mechanisms and functions of homologous recombination, transposition and other specialised DNA rearrangements.
- From signal to cellular response. This part of the course discusses the different mechanisms and cellular processes linked to the control of genetic expression : transcription regulation in prokaryotes and eukaryotes, remodelling of chromatin, posttranscriptional modifications of RNA, nuclear compartmentalisation, translation, sub-cellular targeting, protein recycling, signal transduction, control of the cell cycle and differentiation.