



5 credits

36.0 h + 18.0 h

Q2

Teacher(s)	Hallet Bernard ;Hols Pascal ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	<i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i>
Main themes	<p>Relevant topics in the course are developed around three interconnected axesBBMC2106A: genomicsThe first section of the activity provides a brief introduction on genomics concepts and approaches.-emergence of the genomic era.-Methods of genome sequencing and annotation.-transcriptomics approaches.-proteomics and interactomics approaches.Advances made by genomics studies on the understanding of microbial genome organisation, evolution and functioning are then discussed. These advances serve as a starting point for the development of specific topics in the two other sections. BBMC2106B: regulation of genome expressionThis part of the activity reviews the various mechanisms used by microbial organisms to regulate gene expression at different levels.-from signals to cell responses.-signals integration and global regulatory networks (concepts of regulon, modulon, and stimulon).-stress adaptation.-microbial differentiation process (e.g., sporulation).-cell to cell signalling (quorum sensing) and microbial collectivism (e.g., biofilms formation, toxins production, virulence onset, altruistic behaviours in microbial populations).-phase variation mechanisms.BBMC2106B: regulation of genome plasticityThis section reviews evolutionary strategies used by microbial organisms to adapt to their environment, based on genome rearrangements and lateral gene transfers. These strategies are discussed with respect to those developed by higher organisms.-concepts of genome flux, genome regression, and genome expansion.-concept of mobile genetic elements (plasmids, transposons, integrons and phages).-specialised recombination mechanisms (unity and diversity).-mechanisms of lateral gene transfer (conjugation, transduction and transformation).-mutability and virulence.-emergence of new pathogens, nosocomial affections, multi-resistance.-adaptation to extreme environments.</p>
Aims	<p>Based on up-to-date data from comparative and functional genomics, this course aims at providing an in depth view of the global and specific mechanisms allowing microbial cells and microbial populations to regulate their activities in response to environmental conditions and physiological changes. Long-term evolutionary strategies of the microbial world are also considered and compared to those of higher eukaryotes. The goals are (i) to integrate the different levels at which these mechanisms function (from individual cells to populations and species), (ii) to evaluate their impact on ecology and health, and (iii) to become familiar with the experimental approaches that were developed for their study.Students are asked to actively participate in the course by searching recent information in the literature, by discussing with invited scientists active in the field, and by exerting their criticism with respect to specific topics.</p> <p>-----</p> <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Content	Vol.1: The content of the course is divided into specific modules developed by each teacher based on recent literature and his/her main field of expertise. Concepts are developed so as to reach the current state of the art, both in terms of knowledge and technological developments. Vol 2: External speakers from the academic world or industry are invited to contribute based on their personal scientific and professional activities. Excursions outside the university are organised in order to meet professionals of the field in their specific environment.
Other infos	<p>Precursory courses: Students must be familiar with most fundamental concepts and techniques in microbiology and molecular biology Evaluation: Students present a seminar based on a recent article connected to the course. Integration of the subject is examined during a discussion following the seminar. Support: Articles and documents provided by the teachers Teaching team: Co-teachers with complementary fields of expertise - external speakers</p>
Faculty or entity in charge	BIOL

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Chemistry and Bioindustries	BIRC2M	5	LBIRC2101 AND LBRMC2201	
Master [120] in Biochemistry and Molecular and Cell Biology	BBMC2M	5		
Master [60] in Biology	BIOL2M1	5		