UCLouvain

lbio1323

2026

Molecular signaling

3.00 credits	30.0 h + 10.0 h	Q1

Teacher(s)	Batoko Henri ;Dumont Patrick ;Laloux Géraldine ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	To follow this course, it is necessary to master the knowledge and skills developed in the courses LBIO1223 (Molecular biology)
Learning outcomes	
Evaluation methods	The course aims to provide a broad view of the molecular bases of signaling, from the cell to the organism. This teaching unit will specifically contribute to the mastery of fundamental concepts of biology through an understanding of the structure and functioning of biological systems, the links between the functioning of an organism and its environment. In addition, this course will help to strengthen the sharing of knowledge and methods, promote collaboration and mutual aid. The mastery of these skills will be assessed through an individual oral examination and a continuous assessment of group work for volume 2. In the event of severe failure (i.e. less than 8/20) for one part of the course, an overall absorbing mark will be applied. Furthermore, you would need a grade of at least 12/20 to benefit from an exemption for one or the other part of the course.
Teaching methods	Ex cathedra presentations of the modules by 3 lecturers (Vol. 1), analyzes of recent scientific articles relevant to each of the modules (Vol. 2).
Content	This teaching unit will describe different modes of cell signaling in response to developmental, environmental or pathological changes. The molecular mechanisms, including structural ones, from the perception of stimuli to the physiological response, will be approached through examples drawn from the most recent knowledge in the biology of prokaryotic and eukaryotic cells. The ex cathedra presentations will be given in 3 modules focusing on bacteria, plants and animals. - Bacterial module: This module will deal with examples of molecular signaling set up by different bacterial species to detect and respond to changes in their environment (nutrients, antibiotics, stress), to establish inter-species interactions (quorum sensing, predation, secretion systems), and complete their cell cycle according to external and internal factors (differentiation, growth and replication). Recent or seminal scientific articles will be used as a support for learning and discussion. The concepts will be presented starting from the physiological point of view, towards the cellular, molecular and structural aspects. - Plant module: Plants, as sessile organisms, must respond to changing environments. As a result, plants have developed unique signaling mechanisms throughout evolution and, which allow rapid communication between different parts of the plant. This module will address the molecular signaling mechanisms underlying development and response to environmental constraints and, more specifically, long-range stimuli / effectors (phytohormones, intra-organic signaling molecules) or local range (peptides, transcription factors and some small RNAs). We will highlight recent advances in the understanding of the signaling modules and pathways involved in perception and cellular communication. We will also discuss how different modules of signaling networks can integrate into networks of regulatory genes and contribute to the growth and development of plants. - Animal module: The first part of the course will focus on the study of molecular signaling in animals. After a general introduction, we will explore the different modes of signaling between cells from a molecular point of view (direct contact, paracrine, endocrine and synaptic communication). Emphasis will be placed on the study of receptors and signal transduction pathways that enable cellular response. We will also discuss, through various examples, how cellular communication is affected in various pathologies such as cancer or neurodegenerative diseases
Inline resources	Sharing of documents and information via the course's Moodle and Teams sites.
Bibliography	Des conseils de lecture ou d'approfondissement disponibles à la bibliothèque du secteur SST (BST) seront proposés, le cas échéant, par chaque co-titulaire. The slideshows used in the ex cathedra presentations are available through the course's Moodle site, as well as scientific reference articles, where applicable.
Other infos	The slideshows used in the ex cathedra presentations are available through the course's Moodle site, as well as scientific reference articles, where applicable.

Faculty or entity in charge	BIOL

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Biology	BIOL1BA	3		🔍
Minor in Biology	MINBIOL	3		🔍
Bachelor in Biology, Anthropology and Archaeology	BABA1BA	3		🔍