



Teacher(s)	Dumont Patrick ;Knoops Bernard ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	<p>The main themes of the formation will be :</p> <p><b>1/ Animal cell motility and the cytoskeleton :</b></p> <ul style="list-style-type: none"> <li>- the study of the cytoskeleton in animal cells : actin, actin-associated proteins, microtubules, microtubule-associated proteins, intermediate filaments</li> <li>- the study of motor proteins and their roles in molecular mechanisms involved in animal cell motility</li> <li>- the study of the mechanisms involved in organelle trafficking in animal cells and the role of the cytoskeleton</li> <li>- the study of axonal regeneration in the peripheral and central nervous system in mammals at the cellular and molecular level</li> </ul> <p><b>2/ Cell communication :</b></p> <ul style="list-style-type: none"> <li>- the endocrine, paracrine, autocrine, juxtacrine modes of cell-to-cell communication, including the peculiar case of the synapse</li> <li>- the families of secreted and membranous signalling molecules, and their receptors</li> <li>- the signaling pathways, including the cascades of posttranslational modification of proteins</li> <li>- the effectors of the signalling pathways</li> <li>- a special focus on the modular and interconnected nature of the pathways will illustrate their multi-level and coherent outcome, in terms of cell-cycling, gene expression, intracellular trafficking, metabolism.</li> </ul> <p><b>3/ Cell cycle and apoptosis :</b></p> <ul style="list-style-type: none"> <li>- the description of the different steps in eukaryotic cell cycle</li> <li>- the study of the cell cycle in different mammalian tissues</li> <li>- the study of the role of different molecular actors involved in the control of cell cycle</li> <li>- cell cycle dysfunctions and physio-pathological consequences illustrated by examples from the literature</li> <li>- the different types of cell deaths in animal cells- the different biochemical pathways leading to apoptosis and its control</li> <li>- the study of the physio-pathological role of apoptosis in animal development and in degenerative diseases</li> <li>- the study of intermediate pathways of cell death between apoptosis and necrosis</li> </ul>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>This formation aims at understanding different cellular and molecular mechanisms implicated in animal cell physiology in general and in human cell physiology in particular.</p> <p>This formation will present different concepts in modern animal cell biology including cell motility, cell communication, cell cycle and apoptosis. In particular, molecular mechanisms that are involved in the regulation of animal cell motility will be presented.</p> <p>The essential role of the cytoskeleton will be examined. Examples will be presented from different fields of animal biology.</p> <p>The study of the axonal regeneration in the peripheral and the central nervous system of mammals will illustrate the relationships between different cell types and the role of adhesion molecules as well as proteins of the extracellular matrix in animal cell motility.</p> <p><sup>1</sup> This formation also aims at the in-depth study of intra- and intercommunication between cells in different animal systems, with examples chosen in the recent scientific literature.</p> <p>The objective will be to acquire theoretical knowledge of the different systems of communication, of molecules and signalling cascades, of pathway targets but also to understand the techniques, the methodologies and experimental models used in this field.</p> <p>Finally, in the third part of this formation, molecular and cellular mechanisms involved in cell cycle and apoptosis will be studied. Molecular and cellular mechanisms involved in the control of cell cycle in eukaryotes will be examined in details based on recent scientific literature. Apoptosis and the different pathways that control programmed cell death will be presented and illustrated with recent papers.</p> <p>At the end of this formation, the students should be able to analyze recent data from the scientific literature and to present new concepts in animal cell motility, in animal cell communication as well as in animal cell cycle and apoptosis.</p>

Evaluation methods	Evaluation of the students throughout the year during the flipped classrooms.
Teaching methods	Lectures and flipped classrooms (analyses of recent articles from the literature)
Content	<p>The main themes of the formation will be :</p> <p><b>1. Animal cell motility and the cytoskeleton:</b></p> <ul style="list-style-type: none"> <li>- the study of the cytoskeleton in animal cells: actin, actin-associated proteins, microtubules, microtubule-associated proteins, intermediate filaments.</li> <li>- the study of motor proteins and their roles in molecular mechanisms involved in animal cell motility.</li> <li>- the study of the mechanisms involved in organelle trafficking in animal cells and the role of the cytoskeleton.</li> <li>- the study of axonal regeneration in the peripheral and central nervous system in mammals at the cellular and molecular level.</li> </ul> <p><b>2. Cell cycle and apoptosis:</b></p> <ul style="list-style-type: none"> <li>- the description of the different steps in the eukaryotic cell cycle.</li> <li>- the study of the role of different molecular actors involved in the control of cell cycle.</li> <li>- cell cycle dysfunctions and physio-pathological consequences illustrated by examples from the literature.</li> <li>- the different types of cell deaths in animal cells (apoptosis, necrosis, necroptosis, autophagy).</li> <li>- the different biochemical pathways leading to apoptosis and its control.</li> <li>- the study of the physio-pathological role of apoptosis in animal development and in degenerative diseases.</li> </ul>
Inline resources	<a href="https://moodleucl.uclouvain.be/course/view.php?id=9437">https://moodleucl.uclouvain.be/course/view.php?id=9437</a>
Faculty or entity in charge	BIOL

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biochemistry and Molecular and Cell Biology	BBMC2M	5		
Master [60] in Biology	BIOL2M1	5		
Master [120] in Chemistry and Bioindustries	BIRC2M	5		