UCLouvain

# lbbmc2109

*2019*

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

| 5 credits | 36.0 h + 18.0 h | Q2 |
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| Teacher(s) | Batoko Henri ;Chaumont François ;Hachez Charles ;Morsomme Pierre ; |
| Language : | French |
| Place of the course | Louvain-la-Neuve |
| Main themes | Lectures will be based on up-to-date knowledge and concepts from specialised textbooks, published reviews and original research. The topics covered, albeit varying from year to year according to the scientific development in the field, are divided into three main areas:Part I is devoted to intracellular trafficking of lipids and proteins, with mechanisms of plant cells compared to current understandings in other model organisms. Topics covered include:- organisation and functioning of eukaryotic cell (yeast, plant, mammals) organelles;- pathways of lipids and protein transport within the cell (biosynthetic, endocytotic<br>)- synthesis and post-translational modifications of secretory proteins- synthesis and transport of sterols, structure and function of membrane micro-domains- mechanisms and regulation of selection and targeting of secretory cargoes- molecular mechanisms of polarised secretion- internalisation and recycling of membrane receptors during signallingPart II is devoted to solute transport across biological membranes with emphasis in the biochemical mechanisms. The diversity of membrane transporters, their structure, function and physiological role will be explained. Selected examples from plants and the experimental approaches used will be detailed. Part III deals with: - the main pathways for synthesis of plants secondary metabolites - the diversity of this secondary metabolism according to the developmental stage and species - industrial scale production of plant secondary metabolites - methods to improve secondary metabolites production. |
| Aims | 1 The goal is for students following this course to gain a fundamental understanding of the molecular and mechanistic basis of intracellular exchanges in plant cells, as exemplified by the transport of proteins, lipids, ions and various metabolites. The diversity of secondary metabolites in plants will be analysed.Across the topics covered and by integrating breakthrough experimental approaches in molecular biology, biochemistry and biophysics, a comprehensive understanding of cellular functioning under normal or pathological conditions will be achieved. At the end of the course, it is anticipated that each student would be comfortable in understanding and integrating breakthroughs in techniques used to gain insights in plant cell functioning. Each attendant should be capable of assessing new concepts, put forward new hypothesis and suitable experimental approaches to tackle new biological questions in the field.<br>- - - -<br>*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".* |
| Evaluation methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>The assessment takes into account the preparation and presentation of group work in front of the class. On the other hand, students are asked to self-assess on reverse classroom work and this self-assessment can be used to adjust teachers' grades. |
| Teaching methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>The students will analyze in detail one or more articles of the literature proposed by the lecturers on a theme of the course, and in order to understand and synthesize the relevant scientific information. They will present this theme as part of an inverted class. Depending on the year, a Professor and / or researcher from another Belgian or foreign institution may be invited for a one-week course.<br>Individual or group coaching of students and reverse class |
| Content | Molecular and mechanistic bases of subcellular exchanges in plant cells, through the transport of proteins, lipids, ions and metabolites, as well as the diversity of secondary metabolism.<br>The first part will address intracellular trafficking of lipids and proteins. The mechanisms observed in the plant will be compared with those of other model organisms (yeast and mammals): - The organization and functioning of eukaryotic cell organelles (yeasts, plants, mammals) - The different protein and lipid transport pathways within a eukaryotic cell (biosynthetic pathway, endocytic pathway) - The synthesis and post-translational modifications of proteins for the secretory pathway - The synthesis and transport of certain lipids (sterols), the structure and function of micro-membrane domains - The mechanisms and regulations of protein selection and addressing between subcellular compartments - The molecular mechanisms underlying the polarized localization of certain membrane proteins - The internalization and recycling of membrane receptors during signaling. The second part will explain the biochemical mechanisms responsible for the transport of solutes across biological membranes. The |

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| | diversity of membrane transporters, their structure, their mode of action, and their physiological role will be studied. Various examples from the plant world will illustrate in detail these different aspects as well as the experimental approaches commonly used for the study of membrane transporters. Finally, the third part will deal in detail with: - The main pathways of secondary metabolism in plants - The diversity of this metabolism according to species and development - The main industrial productions of secondary plant metabolites - The methods for improving the production of secondary metabolites |
| Faculty or entity in charge | BIOL |

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