UCL Université catholique de Louvain

# LBBMC2108

*2015-2016*

# Génétique moléculaire et génomique végétale

| 5.0 credits | 36.0 h + 18.0 h | 2q |
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| Teacher(s) : | Chaumont François (coordinator) ; Draye Xavier ; Batoko Henri ; |
| Language : | Français |
| Place of the course | Louvain-la-Neuve |
| Prerequisites : | *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.* |
| Main themes : | The lectures are based on knowledge from specialised textbooks, published reviews and research papers, and the topics covered are grouped in three modules:1- Plant genomics: Genome sequencing allows for the global complement of genes and proteins of a species to be studied. Descriptive genomic will put emphasis on specific characteristics of plant species (genes, transcripts, proteins, intergenic regions, transposons<br>); comparative genomic will highlight the structure and organisation of plant genomes and their evolution; functional genomic will detail the means to characterise particular genes or agronomic traits (quantitative trait loci).2- Molecular biology of plant development: It is a singularity of plants within the multicellular organisms to initiate organs throughout their life cycle. The molecular regulation of cell differentiation and polarisation within the embryo will be detailed. Making use of selected examples of structure and forms of organs initiated by plants, for which our cellular and molecular understanding is available, the contribution of endogenous signals (hormones programmed cell death<br>) and the environment in timing and shaping these organs will be discussed.3- Genomic adaptation and flexibility: Environmental constraints (dehydration, pathogens, toxics ions, xenobiotics<br>) modify the expression pattern of plant genes, ultimately helping the plant to sustain transient or permanent changes. Sensing and distinguishing between these constraints modulate the activity of specific transcription factors at the basis of the changes in gene expression. From best characterised examples from the literature, the biochemical and physiological consequences of the activity of some of these transcriptional factors will be detailed. |
| Aims : | The course aims at giving an in-depth view of plant molecular genetics and genomic through specific examples from the recent scientific literature. The first objective will be to understand how knowledge gained from systematic genome sequencing projects can be exploited to:- unravel the complement of gene transcripts (transcriptomic) or proteins (proteomic) of a given tissue or organ- compare genomes and study their origin and evolution- apprehend genes and proteins function.Secondly, the course will allow the student to understand the molecular basis of some developmental processes in plant such as embryogenesis, differentiation and maturation, organs senescence.Lastly, emphasis will be put upon the complexity of endogenous signals and environmental cues (biotic and abiotic) regulating growth and developmental decisions mainly in angiosperms. At the end of the course, each student should be able to master and explain the strategies and methods used in genomics and molecular biology to investigate plant physiology, initiate new hypothesis and experimental designs to answer biological questions related to plant functioning.<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".* |
| Content : | The course includes 36-hour formal lectures using up-to-date media facilities.<br>As a learning agenda of harnessing, reviewing and communicating synthetically relevant scientific findings, the students would be asked to critically analyse a proposed scientific paper dealing with any area or knowledge developed during the course. The oral presentation (in presence of the lecturers and other attendees) will be followed by a questions and answers session. |
| Other infos : | Exam: Student evaluation would be made of (1) an oral presentation from a critical reading of a proposed or chosen scientific paper (2) answering questions around the findings of the presented paper and knowledge from the lectures. A copy of the lectures' slide show will be made available from i-Campus shareware. |
| Faculty or entity in charge: | BIOL |

## Programmes / formations proposant cette unité d'enseignement (UE)

| Intitulé du programme | Sigle | Credits | Prerequis | Acquis d'apprentissage |
|---|---|---|---|---|
| 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 | LBIRC2101 **and** LBRMC2201 | |