UCLouvain

lsinc1332

2022

Biotechnology: omics

5.00 credits	30.0 h + 30.0 h	Q2

This learning unit is not open to incoming exchange students!

Teacher(s)	Branders Vincent ;
Language :	French
Place of the course	Charleroi
Prerequisites	• Molecular biology • Biochemistry • Data visualization • Statistics *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	This course will cover the different biological analysis techniques that generate high-throughput data (so-called "omics" techniques), such as: DNA and RNA sequencing, proteomics, metabolomics... (non-exhaustive list which will be adapted according to the rapid evolution of this field). For each method, the course will introduce: • The operating principle of each method (sequencing, mass spectrometry, etc.) • Analysis, processing and normalization of raw data • Data interpretation and visualization. • The biases and pitfalls related to these techniques (problems of technical and biological variability, reproducibility, experimental design). Generic methods for analyzing biological data will also be covered (clustering, enrichment, ontologies, etc.), in connection with the data analysis course and the statistics course. Finally, the course will include an introduction to the databases that can be used in this field (TCGA, GEO, Encode etc).
Learning outcomes	**At the end of this learning unit, the student is able to :** • Understand the operating principle of omics methods • Understand the concepts and principles of omics data analysis • Analyze simple omics data • Understand and critique a publication presenting omics data
Evaluation methods	The final grade consists of • 25% for practical sessions occurring during the semester • 75% for the final exam The practical session's grade is fixed at the end of the semester: there is no option to receive a new grade for it during the second session. The final exam is, by default, a written exam (on paper or, when appropriate, on a computer).
Teaching methods	Lectures and guided practical session 1. Practical sessions are performed in groups to use databases and results interpretation tools
Content	1. Introduction 2. DNA sequencing (genomics) • Principle and technologies available • Genome, exome, panel • Analysis of raw data (alignment, reference genome, construction of a new genome, calling of variants, quality controls, etc.) • Interpretation 3. RNA sequencing (transtriptomics) • Principle and technologies • Gene expression analysis

	• Variants, mergers, new transcripts 4. Proteomics • Mass spectrometry, principle and technologies • Data analysis (identification of peptides and proteins, quantification) • Data interpretation 5. Metabolomics 6. Single Cell
Inline resources	https://moodle.uclouvain.be/course/view.php?id=5853
Faculty or entity in charge	SINC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Computer Science	SINC1BA	5	LSINC1231 AND LSINC1211	🔍