



**This learning unit is not open to incoming exchange students!**

Language :	French
Place of the course	Charleroi
Prerequisites	<p>This course assumes that you have acquired the basic notions of high school biology and chemistry:</p> <p>General necessary prerequisites of Biology: Descriptive cell biology: organelles (structure and functions); modes of cell division: mitosis and meiosis</p> <p>Necessary general prerequisites of Chemistry: Atomic orbitals, chemical bonds, pH and osmolarity, the structure of water and its properties, the functional groups of living organisms and the properties they confer on a carbon molecule, condensation/polymerization reactions, oxido- reduction,...</p>
Main themes	<p>Give a general biology base to students coming out of high school but with a stronger and faster orientation in terms of their awareness of the complexity and the masses of data generated and a stronger emphasis on:</p> <ul style="list-style-type: none"> <li>Notion of sequences and comparison of sequences, notions of complexity-high throughput and focus on systems biology (which is the basis of the various OMICs).</li> <li>Proteins (structure, folding, impact of mutations) and their functions</li> <li>Gene expression and examples of genetic diseases</li> <li>Notions of evolution at the molecular level</li> <li>Definition of synthetic biology</li> </ul>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <ul style="list-style-type: none"> <li>- perceive the complexity of living things and the need to process "big data"</li> <li>- identify mutations and understand their possible impacts to understand evolution at the molecular level</li> <li>- focus on molecules and biomolecules which are polymers that can be analyzed by alignment and sequence processing software</li> <li>- identify biomolecules and their ability to react and interact</li> <li>- Understand the basic principles of intercellular communication and signaling (signal transduction) in a cell</li> </ul> <p>Students will have developed methodological and operational skills. In particular, they will have developed their ability to:</p> <ul style="list-style-type: none"> <li>- Understand the complexity of life and the need to apply statistical and computer tools for the processing of experimental data generated by technologies commonly used in modern life sciences.</li> </ul>
Evaluation methods	<p>3 mandatory practical sessions. The average of the evaluations of the TPs accounts for 4 points out of 20 in the final score of the exam.</p> <p>In the event of an unjustified absence from just ONE practical session, the admissions jury may have to prohibit the student from taking the theory exam.</p> <p>In the event of admission to take the EU exam following an unjustified absence from a lab, a penalty (withdrawal of 4 points) will be applied to the final mark of the theoretical exam.</p> <p>Oral exam if not too many students, MCQ if there are too many students.</p>
Teaching methods	Part ex-cathedra, part flipped classroom.
Content	<p><b>The aims of this general biology course are:</b></p> <p>1° to provide basic training on certain aspects of the various components of biology, making it possible to raise awareness very early on of the problems of "big data".</p> <p>2° to give a quick and broad vision of several techniques and/or technologies present in the life sciences (generating in part large quantities of information without a priori) and aiming to reveal and raise awareness of the needs of biological approaches -computers to process and analyze data and give them biological meaning.</p> <p><b>Chapter 1: Biology ... a science and the characteristics of living things</b></p>

	<p><b>Chapter 2: The building materials of living matter and the molecules of life: general structure of macromolecules (polymers) and their monomers</b></p> <p><b>Chapter 3: Structure of prokaryotic and eukaryotic cells and viruses.</b></p> <p><b>Chapter 4: Relationships between eukaryotic cells and microbiota</b></p> <p><b>Chapter 5: DNA: the genetic material</b></p> <p><b>Chapter 6: Gene expression: genes and how they work</b></p> <p><b>Chapter 7: Genomes and Controls of Gene Expression</b></p> <p><b>Chapter 8: Genetics of Prokaryotes and Viruses</b></p> <p><b>Chapter 9: Epigenetics, chromatin modifications and regulation of gene expression</b></p>
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		