

Courses	Level of studies	SEMESTER	Number of hours taught	Number of ECTS delivered	Synopsis
Plant biotechnology	Master academic studies	1 - Fall semester	36	3	<p>Practical sessions</p> <ol style="list-style-type: none"> 1. Plant in vitro culture 2. Genetic transformation of the moss <i>Physcomitrella patens</i> 4. Demonstration of the action of gibberelins in barley seeds germination 5. Study of the antibacterial activity of essential oils 6. Analysis of the composition of mint essential oil 7. Plants-microorganism associations 8. Carregens extraction of a red algae: <i>Euchema Cottonii</i>
Genetic engineering - Bioinformatics	Master academic studies	1 - Fall semester	38	3	<p>Tools for sequences alignment Techniques for cloning DNA fragment in bacterial/yeast systems Experimental techniques of genetic engineering and molecular biology (cloning, PCR, Southern Blot) Organize and plan an experiment</p> <ol style="list-style-type: none"> 1. Construction of DNA probes of a gene of interest 2. Cloning of DNA fragments (probes) in plasmids 3. Genomic DNA Extraction 4. Enzymatic digestion with restriction enzymes 5. Probe and Molecular Hybridization (Southern)
Microbiology	Master academic studies	1 - Fall semester	32	2	<p>Standardized methods in microbiology for the detection of bacteria, introduction to the quality insurance (traceability) Microorganisms at the center of biotechnology - Useful and harmful bacteria.</p> <ol style="list-style-type: none"> 1. Standards to the application: standardized methods of research and enumeration of major bacteria in food hygiene 2. Use of molecular detection technologies for microorganisms 3. Constraints of work organization in microbiology: holding of a laboratory notebook, traceability
Organic Chemistry	Master academic studies	1 - Fall semester	28	2	<p>Consolidate fundamental principles of chemistry in order to understand molecular biological processes. Understand the constraints and the methods developed for the synthesis of bioactive molecules. Amino acid coupling, racemic splitting, Stereospecificity of enzymatic reactions</p>

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Genetics	Master academic studies	2 - Spring Semester	29	2	<p>Prokaryotes and eukaryotes genetics for industrial uses</p> <p>Bacterial genetics: contributions / applications in terms of molecular tools and technologies that stem from knowledge of bacterial genetics.</p> <p>Plant genetics: quantitative genetics, genetic breeding, segregation, molecular markers, physical map and genetic map, genetics of association, genomic selection, molecular marker generation and polymorphism study, genetics of association, optimal use of marker-assisted selection.</p>
Biotechnology	Master academic studies	2 - Spring Semester	67	4	<p>Host cell systems for the production of recombinant proteins.</p> <p>Acquisition of a global vision of the process from the production to the purification of recombinant proteins.</p> <p>Production system in bacteria and yeast.</p> <p>Developing autonomy in a lab context</p>
Microbiology	Master academic studies	2 - Spring Semester	67	4	<p>Production and use of microorganisms and / or enzymes in the food industry.</p> <p>Separation and purification techniques</p> <p>Introduction to Experimental Plans</p> <p>Simulation and Modeling</p>
Immunology	Master academic studies	2 - Spring Semester	20	1	<p>Acquire the basics in immunology and immunological techniques</p> <p>Understanding the mechanisms involved in the immune response</p> <p>Knowledge of some major known pathologies and different detection methods</p> <ol style="list-style-type: none"> 1. Double immuno-diffusion (Ouchterlony) 2. Detection of antigens by the spotting method (Dot blot) 3. Study of the components of a rabbit serum by Western Blot 4. ELISA technique: BSA / anti-BSA system 5. SDS-PAGE Technology
Bioprocesses and enzyme immobilization biocatalysis	Master academic studies	2 - Spring Semester	60	4	<p>Give an overview of the nature and economic importance of current industrial biological processes.</p> <p>Development of skills in the field of the application of biocatalysts (microorganisms or isolated enzymes) for the production of molecules of industrial interest.</p> <p>Analysis of the constraints related to the production of molecules of biological interest. Proposed biotechnological solutions.</p>