




5.00 credits

37.5 h + 15.0 h

Q1

Teacher(s)	Chaumont François (coordinator) ;Hachez Charles ;
Language :	French > English-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	General biochemistry and general genetics
Main themes	The theoretical part will detail the major steps of genetic engineering: preparation and screening of libraries, gene cloning, gene characterization and modification, gene expression in heterologous hosts. Concrete problems of genetic engineering in the microbial, animal and plant fields will be discussed. Recent examples of genetic engineering achievements from the recent literature will be discussed.
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>a. Contribution de l'activité au référentiel AA (AA du programme) Cohérence des AA cours en regard de ceux du programme 1.2, 1.3 2.2 3.4, 3.9 6.1, 6.2</p> <p>b. Formulation spécifique pour cette activité des AA du programme</p> <p>1 By the end of this course, the student should be able:</p> <ul style="list-style-type: none"> - To explain the main genetic engineering methodologies - To choose, according to the problem posed, among different strategies used to clone a gene, modify it and transfer it into other organisms - To propose experimental approaches aimed at solving practical problems of genetic engineering in the microbial, animal and plant fields - To understand and set out examples of genetic engineering in the microbial, animal and plant fields as described in English scientific journals
Evaluation methods	<p>The assessment is based, on the one hand, an open-book written examination on the solution of exercises simulating concrete genetic engineering problems and also covering the material covered during the practical work (60%, 12 points out of 20 of the final mark) and, on the other hand, the preparation and presentation in groups of a genetic engineering theme in front of the class (flipped classroom; 40%, 8 points out of 20 of the final mark).</p> <p>Existence of an absorbing mark: a minimum mark of 8/20 in the written exam (i.e. 4.8 points out of 20 of the final mark) is required for the mark related to the flipped classroom part to be taken into account in the calculation of the final mark.</p> <p>The flipped classroom part is subject to continuous evaluation of student work, accounting for 40% of the final course evaluation. Therefore, no further evaluations are organized during the exam sessions for this part. The mark obtained for this part is deemed to be attached to each of the sessions of the academic year. Students are also required to self-assess on flipped classroom work and this self-assessment can be used to adapt the grades.</p>
Teaching methods	<p>The course is organized as a flipped classroom. Students are divided into work groups during the first course and must work on the themes assigned to them in order to prepare two presentations to the rest of the audience. They will develop certain theoretical aspects related to genetic engineering (key enzymes, vectors, cloning strategies and associated molecular biology techniques - DNA and RNA sequencing - Directed mutagenesis - Gene expression in host organisms, etc.). They will then focus on a model organism used in genetic engineering and answer a thematic synthesis question.</p> <p>Practical work sessions will illustrate, in a very concrete way, the basics of genetic engineering.</p> <p>Classroom exercises are also organized. They simulate specific genetic engineering problems and are solved individually by the students before being solved collectively.</p>
Content	<p>Theoretical part: Methods of genomic and cDNA screening - Global analysis of the genome and its expression (genomics, transcriptomics, proteomics, metabolomics) - directed mutagenesis - gene expression in heterologous hosts: Escherichia coli, other bacteria, yeast, transgenic cell lines and transgenic organisms (animals and plants) - protein engineering - genic therapy.</p> <p>Solving problems: concrete problems of genetic engineering will be exposed and solved by the students.</p>

Inline resources	Moodle
Bibliography	<p>Le syllabus et les notes de cours et de travaux pratiques rédigées par l'équipe d'enseignants et dont l'usage est jugé obligatoire sont disponibles sur Moodle.</p> <p>Le cours ne fait appel à aucun autre support particulier qui serait payant et jugé obligatoire. Les ouvrages payants qui seraient éventuellement recommandés le sont à titre facultatif et sont tous consultables à la Bibliothèque des Sciences et Technologies.</p>
Other infos	<p>This course can be given in English.</p> <p>Participation in the first course is mandatory for the organization of the flipped classroom.</p>
Faculty or entity in charge	AGRO

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biochemistry and Molecular and Cell Biology	BBMC2M	5		
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [60] in Biology	BIOL2M1	5		
Master [120] in Chemistry and Bioindustries	BIRC2M	5		