

## Faculty of Biological, Agronomic and Environmental Engineering

### BIRC2103 Molecular biology and concepts of genetic engineering

[22.5h+22.5h exercises] 3.5 credits

This course is taught in the 1st semester

**Teacher(s):** Marc Boutry, François Chaumont  
**Language:** French  
**Level:** Second cycle

#### Aims

This course aims at providing the students with the knowledge in molecular biology and the technical competence necessary to understand the major applications of genetic engineering.

#### Main themes

1. The first part (7,5 h) aims at understanding, at the molecular level, how the genetic information of a living organism is expressed through transcription, translation, post-translational modification and subcellular targeting.
2. The second part (22,5 h) will present molecular biology under its technological aspects. Methods to isolate and characterize genes, modify and transfer them among different species will be outlined.
3. Practicals (22,5 h) will illustrate the most common techniques of genetic engineering.

#### Content and teaching methods

Part 1: Molecular biology: transcription and translation regulation, post-translational modifications, protein targeting in subcellular compartments, regulated proteolysis of proteins.

Part 2: Concepts of genetic engineering : restriction endonucleases, modification enzymes, cloning vectors (plasmids, phages, artificial chromosomes), gene characterization (restriction map, sequencing, expression profile), genomic and cDNA libraries, basic methods for library screening, PCR techniques, heterologous expression.

Part 3: Practicals: gene cloning, plasmid purification and characterization (restriction profile, sequencing), directed mutagenesis, heterologous expression in E. coli, recombinant protein purification.

#### Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisite : general course of biochemistry and genetics  
 Supplementary course: BRMC 2102: Genetic engineering

**Other credits in programs**

<b>BIR22/0C</b>	Deuxième année du programme conduisant au grade de bio-ingénieur: chimie et bio-industries (Technologies & gestion de l'information)	(3.5 credits)	Mandatory
<b>BIR22/1C</b>	Deuxième année du programme conduisant au grade de bio-ingénieur: Chimie et bio-industries (Sciences, technologie & qualité des aliments)	(3.5 credits)	Mandatory
<b>BIR22/2C</b>	Deuxième année du programme conduisant au grade de bio-ingénieur : Chimie et bio-industries (Ingénierie biomoléculaire et cellulaire)	(3.5 credits)	Mandatory
<b>BIR22/3C</b>	Deuxième année du programme conduisant au grade de bio-ingénieur : Chimie et bioindustries (Nanobiotechnologies, matériaux et catalyse)	(3.5 credits)	Mandatory
<b>BIR22/4C</b>	Deuxième année du programme conduisant au grade de bio-ingénieur : Chimie et bio-industries (Technologies environnementales: eau, sol, air)	(3.5 credits)	Mandatory
<b>CHIM22</b>	Deuxième licence en sciences chimiques	(3.5 credits)	