

Faculty of Biological, Agronomic and Environmental Engineering

BIRA2102 Applied biotechnology

[30h+0h exercises] 2.5 credits

This course is taught in the 1st semester

Teacher(s): Pierre Bertin, Claude Bragard, Isabelle Donnay
Language: French
Level: Second cycle

Aims

The course brings the student to understand major biotechnologies applied to the animal, microbial and plant domains under the perspectives of production and/or genetic improvement. The foundations and the context of knowledge discovery in biotechnology are also approached, as a way to help the student to understand the consequences of biotechnologies beyond the scientific performance (e.g. economy, nutrition and health, society). As such, the public of this course is not restricted to students whose main interest lays in the fields of production and genetic improvement.

Main themes

The course reviews successively the principles of cell culture (part A), cell modification (part B) and organism regeneration (part C). Selected examples stress the similarities between animal, microbial and plant biotechnologies.

In part A, the notions of culture initiation, manipulation and conservation of microorganisms (kinetics of growth, strains conservation), animals (stem cells, in vitro production and manipulation of embryos, cryobanks) and plants (totipotency, in vitro culture, protoplasts, doubled haploids, regulation of cell growth and development) are explained.

Part B presents the principles of cell modification (transformation, transgenesis, mutagenesis, heterologous / homologous recombination, vectors). Notions of gene isolation, cloning, construct and genomics are also introduced as the underlying techniques rely on recombinant DNA technology.

Part C details the regeneration of organisms from modified cells (animal and plant cloning, selection (antibiotics), marker genes, protoplast fusion, in vitro cell culture)

Content and teaching methods

Biotechnologies are evolving at different speed in the microbial, animal and plant sciences domains, despite a number of common principles shared by these domains. This course therefore represents a unique opportunity to address important questions relating to the dynamics of biotechnological innovation and to encourage the student to structure his knowledge beyond conventional boundaries within the lifesciences domain. Wherever possible, reference is made to the various problematics arising from the use of biotechnologies.

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

Precursory courses (not mandatory) BIR1321 BIR1322 BIR1323 BIR1324 BIOL218OE

Other credits in programs

BIR22/0A	Deuxième année du programme conduisant au grade de bio-ingénieur: Sciences agronomiques (Technologies et gestion de l'information)	(2.5 credits)	Mandatory
BIR22/1A	Deuxième année du programme conduisant au grade de bio-ingénieur: sciences agronomiques (Sciences, technologie et qualité des aliments)	(2.5 credits)	Mandatory
BIR22/7A	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences agronomiques (Ressources en eau et en sol)	(2.5 credits)	Mandatory
BIR22/8A	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences agronomiques (Intégrée, productions animales, végétales & économie)	(2.5 credits)	Mandatory
BIR22/9A	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences agronomiques (Protection intégrée des plantes)	(2.5 credits)	Mandatory