

LIFE SCIENCES 2 FIELD_10 ECTS

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Bioseparation

Introducing

Description

Bioseparation : Precipitation: definition, review of precipitation processes, type of precipitation. Centrifugation and ultracentrifugation: introduction principle theory of sedimentation, and centrifugation, centrifuge equipment and operations. Membrane separation: principles and theory, membrane type and module, membrane fouling. Electrophoresis: principle and theory, electrophoresis equipment, gel electrophoresis, SDS-PAGE, isoelectric focusing, 2-D electrophoresis, capillary electrophoresis.

Objectives

Bioseparation: At the end of this module, Students should understand and be able to explain

- the mechanisms exploited by the separative techniques commonly used in biochemistry and biotechnology, particularly in the case of biocatalysts
- the properties of biological molecules exploited in the application of separative techniques
- Precipitation (proteins, nucleic acids),
- centrifugation and ultracentrifugation,
- membrane separation (MF, UF, NF, dialysis, electrodialysis)
- electrophoresis

Necessary prerequisites

I1ANETCH Chemistry
I2BECH10 Organic Chemistry
I2BEBS10 Structural Biochemistry
I2BEAN20 Analytical Methods
I2BEGR20 Reaction Engineering

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Enzymology

Introducing

Description

Enzymology: Detailed description of

- Classifications of enzymes, general and specialized databases
- Kinetic models: Michaelian enzymes, inhibition mechanisms, kinetic models of multi-substrate enzymes, allosteric enzymes and regulation
- Principles of nucleic acid and protein sequence alignment (local and global alignment)
- Biophysical methods used to determine 3D protein structure
- Visualization of catalytic site and analysis of catalytic mechanisms

Objectives

At the end of this module, students should understand and be able to explain

- the importance of studying enzymes and the use of these biocatalysts in biotechnology in the context of ecological transition, sustainable development related to the bioeconomy.
- the methods for measuring the velocity of an enzymatic reaction
- the equations applied to model the kinetics of enzymatic reactions
- the influence of the main physico-chemical parameters on the catalytic efficiency.
- the methods used to determine and analyze the enzyme three-dimensional structure

Students will also learn to use:

- databases of nucleic acids as well as databases of

protein sequences and three-dimensional structures
- computational tools used for sequence alignments (nucleic acids or proteins), visualization of tertiary protein structures and for structure-function relationship studies.

Necessary prerequisites

I1ANETCH Chemistry
I2BECH10 Organic Chemistry
I2BEBS10 Structural Biochemistry
I2BEAN20 Analytical Methods
I2BEGR20 Reaction Engineering

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Bacterial genetics

Introducing

Description

The mechanisms leading to mutations, whether specific or broader, will be reviewed (mutagens, horizontal transfer mechanisms, transposition). The course will address prokaryotic transcriptional and translational regulations. It will present the biotechnology applications of this knowledge, as well as the tools for regulation, expression measurement and screening.

Objectives

The objective of this EU is to address the mechanisms that allow bacteria to evolve their genetic sequence and best respond to environmental conditions.

Necessary prerequisites

French.

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