



Specialisation Bio- engineering and nanotechnology



BIO-INGÉNIERIE

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Lecturers: Emmanuelle LAURENCEAU

| Lecturers : 0.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

Objectives

Keywords :

Programme

Learning outcomes

Independent study Objectifs :

Méhodes :

Core texts

Assessment



IMAGERIES MÉDICALES

IMAGERIES MÉDICALES

Lecturers: **Emmanuelle LAURENCEAU, Christelle YEROMONAHOS**

| Lecturers : 6 | TC : 0.0 | PW : 9 | Autonomy : 6 | Study : 8 | Project : 0.0 | Language : FR

Objectives

Through this course, 3 main imaging and image processing techniques will be discussed: electronic cryo-tomography, X-ray imaging and ultrasound imaging. Concrete examples of image reconstruction and modeling as well as manipulations on devices (RX, US) will help to understand the complete chain of image formation and its interpretation.

Keywords :

Programme

Course (6h):

- Principle of electronic cryo-tomography
- Principle of X-ray imaging
- Principle of Ultra-sound imaging

Practical work (9h): 1 practical to choose on one of the 3 imaging techniques

Learning outcomes

- Understand the scientific challenges of medical imaging in terms of information extraction
- Understand the difficulties associated with reconstructing images from physical measurements and know the methods to overcome them
- Know the signal processing techniques used in ultrasound imaging

Independent study

Objectifs :

- Méthodes :
- Processing of electronic cryo-tomography images from free software (eman2 and Jsubtomo)
 - Bibliographic studies
 - Processing of data acquired on a research ultrasound system

Core texts

Assessment

75% knowledge (practical report), 25% know-how (oral presentation)



INTERACTIONS MATÉRIAU-VIVANT

INTERACTIONS MATÉRIAU-VIVANT

Lecturers: **Emmanuelle LAURENCEAU, Vincent FRIDRICI**

| Lecturers : 3 | TC : 2 | PW : 6 | Autonomy : 6 | Study : 4 | Project : 0.0 | Language : FR

Objectives

Through this course, the fundamental aspects linked to the biological, physicochemical and mechanical phenomena involved during the contact between a surface and a biological medium will be treated. The link with the bioengineering of interfaces and its application will be approached in various forms: analysis of articles, realization of devices, design office

Keywords :

Programme

Course (3h):
- Physico-chemistry of interfaces
- Biomechanics of interfaces

BE (4h): Tribo-mechanics of living tissue

Practical work (6h): Realization of a glucose biosensor

TD (2h): Restitution of the analysis of scientific articles

Learning outcomes

- Understanding the biomechanical challenges of aging and prosthetic medicine
- Know some techniques for characterizing living tissue
- Establishment of an experimental protocol
- Write a complete technical report, correctly referenced

Independent study

Objectifs :

Méthodes : Analysis of scientific articles

Core texts

Assessment

50% knowledge (oral presentation of review articles), 50% know-how (practical report)



BIOPRODUCTION

BIOPRODUCTION

Lecturers: Emmanuelle LAURENCEAU

| Lecturers : 4 | TC : 0.0 | PW : 7 | Autonomy : 2 | Study : 4 | Project : 0.0 | Language : FR

Objectives

This course will allow engineering students to identify the stages of production of a recombinant protein as well as the different purification methods, their roles and interests in bioproduction processes. The production of recombinant proteins by genetic engineering methods is a common process in most areas of biotechnology. Using perfectly mastered methods, this process makes it possible to obtain specific proteins, in particular of therapeutic interest, with a very high yield.

Keywords :

Programme

Course (4h):

- Principle of genetic engineering
- Production and purification of recombinant protein

BE (4h): Biofermenter

Practical (7h): Microbrewery

Learning outcomes

- Know the techniques of bio-production and characterization of biomolecules
- Set up an experimental protocol
- Present results in a relevant, rigorous and critical manner for analysis
- Write a complete technical report, correctly referenced

Independent study

Objectifs :

Méthodes : Preparatory work for the practical

Core texts

Assessment

50% knowledge (course exam and BE), 50% know-how (practical report)



BIO-INFORMATIQUE, BIO-STATISTIQUE ET MODÉLISATION

BIO-INFORMATIQUE, BIO-STATISTIQUE ET MODÉLISATION

Lecturers: Emmanuelle LAURENCEAU, Christelle YEROMONAHOS

| Lecturers : 0.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 15 | Project : 0.0 | Language : FR

Objectives

Through this course, basic statistical tools as well as modeling concepts and techniques will be discussed to allow engineering students to analyze and model data in the life sciences. From concrete examples, analysis and modeling strategies will be studied, and the development of a complete model will be worked out.

Keywords :

Programme

BE 1 (4h): Modeling of living tissue
BE 2 (4h): Cell membrane modeling in molecular dynamics
BE 3 (4h): Epidemiology and vaccination
BE 4 (3h): Statistical tools for life sciences

Learning outcomes

- Understanding modeling
- To be able to simulate and analyze a model
- Recognize the application contexts of statistical methods and implement them on datasets
- Understand the principle of molecular dynamics simulations

Independent study

Objectifs : This activity is not concerned with framed autonomy activities outside personal work.

Méthodes : This activity is not concerned with framed autonomy activities outside personal work.

Core texts

Assessment

1 written report for each BE, each counting for 25% of the final mark