

# Master in Bio-informatics and Modelling

## Focus Research

The Master in Bioinformatics and Modelling is an interdisciplinary programme that enables students to master and develop bioinformatic tools and modelling approaches to address biological questions. The curriculum is organised around 3 main topics: (1) genomics, proteomics, and evolution, (2) biophysics and structural bioinformatics, and (3) modelling dynamical systems in biology.

### Bloc 1 | M-BINFA | MA-BINF

## Cours de mise à niveau

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*A total of ten credits chosen from the following*

#### Module 1

BIOL-F208 (optional) **Biochimie et physiologie de la cellule** | Vincent RAUSSENS (Coordinator), Véronique KRUYSS and Maud MARTIN  
 ⌚ 5 crédits [lecture: 60h] 📅 first term 🗨️ French

BIOL-F4003 (optional) **Biologie générale et mécanismes de l'évolution** | Patrick MARDULYN (Coordinator) and Martine VERCAUTEREN  
 ⌚ 5 crédits [lecture: 60h] 📅 first term 🗨️ French

#### Module 2

INFO-F101 (optional) **Programmation** | Thierry MASSART (Coordinator)  
 ⌚ 10 crédits [lecture: 36h, tutorial classes: 36h, practical work: 24h, project: 60h] 📅 first term 🗨️ French

## Cours obligatoires

BINF-F401 **Computational Methods for Functional Genomics** | Vincent DETOURS (Coordinator)  
 ⌚ 5 crédits [lecture: 36h, practical work: 24h] 📅 second term

BINF-F402 **Genomics, Transcriptomics and Epigenomics** | Jean-François FLOT (Coordinator) and Matthieu DEFANCE  
 ⌚ 5 crédits [lecture: 48h, project: 30h] 📅 first term 🗨️ English

BINF-F403 **Biophysics and structural bioinformatics I** | Dimitri GILIS (Coordinator) and Fabrizio PUCCI  
 ⌚ 5 crédits [lecture: 36h, practical work: 24h] 📅 first term 🗨️ English

BINF-F404 **Modeling dynamical systems in biology** | Didier GONZE (Coordinator)  
 ⌚ 5 crédits [lecture: 36h, practical work: 24h] 📅 first term

BINF-F405 **Biophysics and structural bioinformatics II** | Dimitri GILIS (Coordinator), Fabrizio PUCCI and Wim VRANKEN  
 ⌚ 5 crédits [lecture: 36h, practical work: 24h] 📅 second term

BING-F4002 **Acquisition et analyse de données** | Marius GILBERT (Coordinator), Marc DUFRENE and Simon Dellicour  
 ⌚ 5 crédits [lecture: 24h, tutorial classes: 36h] 📅 first term 🗨️ French

CHIM-F422 **Modélisation des rythmes du vivant** | Didier GONZE (Coordinator), Geneviève DUPONT and Jean-Christophe LELOUP  
 ⌚ 5 crédits [lecture: 24h, tutorial classes: 24h, project: 30h] 📅 second term 🗨️ French

INFO-F422 **Statistical foundations of machine learning** | Gianluca BONTEMPI (Coordinator)  
 ⌚ 5 crédits [lecture: 24h, tutorial classes: 12h, project: 60h] 📅 second term 🗨️ English

INFO-F434 **Biological databases and analysis of macromolecular sequences** | Didier GONZE (Coordinator)  
 ⌚ 5 crédits [lecture: 36h, practical work: 24h] 📅 first term 🗨️ English

INFO-F438

[Algorithms in computational biology](#) | John IACONO (Coordinator)

🕒 5 credits [lecture: 24h, tutorial classes: 12h, project: 60h] 📅 second term 🗣️ English



# Master in Bio-informatics and Modelling

## Focus Research

### Bloc 2 | M-BINFA | MA-BINF

## Poursuite du cursus

### Cours obligatoires

- MEMO-F518** **Mémoire** | Jean-François FLOT (Coordinator)  
 ⌚ 25 credits [mfe/tfe: 300h] 📅 first and second terms
- STAG-F036** **Stage (en milieu académique ou industriel)** | Gianluca BONTEMPI (Coordinator)  
 ⌚ 10 credits [work placement: 120h] 📅 first and second terms 🗨️ French

### Cours spécifiques

Sur demande motivée de l'étudiant-e et moyennant accord du Jury, un maximum de 10 crédits de cours à options peuvent être choisis parmi les cours d'un autre Master de l'ULB (ou, de manière exceptionnelle et à titre de dérogation pour un maximum de 5 crédits, parmi les cours d'un Bachelier de l'ULB).

*A total of 25 credits chosen from the following*

- BINF-F501** (optional) **Determination of biomolecular structures and structural data analysis** | René WINTJENS (Coordinator)  
 ⌚ 5 credits [lecture: 18h, tutorial classes: 10h, project: 32h] 📅 first term
- BING-F525** (optional) **Modélisation des écosystèmes aquatiques** | Nathalie GYPENS (Coordinator)  
 ⌚ 5 credits [lecture: 24h, tutorial classes: 36h] 📅 first term 🗨️ French
- BING-H4000** (optional) **Modeling and control of dynamical systems in bioengineering** | Philippe BOGAERTS (Coordinator) and Didier GONZE  
 ⌚ 5 credits [lecture: 48h, tutorial classes: 12h] 📅 second term 🗨️ English
- CHIM-F4001** (optional) **Rational drug design and PKPD modeling** | Jean-Christophe LELOUP (Coordinator) and Martine PREVOST  
 ⌚ 5 credits [lecture: 36h, tutorial classes: 12h, project: 24h] 📅 second term 🗨️ English
- CHIM-F443** (optional) **Approches computationnelles des états de la matière** | Nathalie VAECK (Coordinator), Antoine Aerts, Emilie CAUET and Martine PREVOST  
 ⌚ 5 credits [practical work: 36h, project: 24h] 📅 first term 🗨️ French
- INFO-F409** (optional) **Learning dynamics** | Tom LENAERTS (Coordinator)  
 ⌚ 5 credits [lecture: 24h, project: 60h] 📅 first term 🗨️ English
- INFO-F413** (optional) **Data structures and algorithms** | Jean CARDINAL (Coordinator)  
 ⌚ 5 credits [lecture: 24h, tutorial classes: 12h, project: 60h] 📅 first term 🗨️ English
- INFO-F439** (optional) **Advanced Methods in Bioinformatics** | Matthieu DEFRANCE (Coordinator) and Wim VRANKEN  
 ⌚ 5 credits [lecture: 24h, project: 90h] 📅 second term 🗨️ English
- INFO-H400** (optional) **Medical Information Systems** | DAVID WIKLER (Coordinator)  
 ⌚ 5 credits [lecture: 24h, tutorial classes: 24h, practical work: 12h] 📅 second term 🗨️ English
- INFO-H410** (optional) **Techniques of artificial intelligence** | Hugues BERSINI (Coordinator)  
 ⌚ 5 credits [lecture: 24h, tutorial classes: 12h] 📅 second term 🗨️ English
- INFO-H413** (optional) **Heuristic optimisation** | Thomas,T STUTZLE (Coordinator)  
 ⌚ 5 credits [lecture: 24h, tutorial classes: 12h, practical work: 24h] 📅 second term 🗨️ English

- INFO-H414  
(optional) **Swarm Intelligence** | Marco DORIGO (Coordinator) and Mauro BIRATTARI  
⌚ 5 credits [lecture: 12h, practical work: 48h] 📅 second term 🗨 English
- INFO-H415  
(optional) **Advanced databases** | Esteban ZIMANYI (Coordinator)  
⌚ 5 credits [lecture: 24h, tutorial classes: 24h, practical work: 12h] 📅 first term 🗨 English
- INFO-H500  
(optional) **Image acquisition and processing** | Olivier DEBEIR (Coordinator)  
⌚ 5 credits [lecture: 24h, practical work: 24h] 📅 first term 🗨 English
- INFO-H501  
(optional) **Pattern recognition and image analysis** | Olivier DEBEIR (Coordinator) and Christine DECAESTECKER  
⌚ 5 credits [lecture: 36h, practical work: 24h] 📅 second term 🗨 English
- INFO-H515  
(optional) **Big Data: Distributed Data Management and Scalable Analytics** | Dimitrios SACHARIDIS (Coordinator) and Gianluca BONTEMPI  
⌚ 5 credits [lecture: 24h, tutorial classes: 12h, project: 24h] 📅 second term 🗨 English
- PHYS-F512  
(optional) **Molecular motors and stochastic processes** | Pierre GASPARD (Coordinator)  
⌚ 5 credits [lecture: 36h, tutorial classes: 24h] 📅 first term 🗨 English
- STAT-F408  
(optional) **Computational statistics** | Maarten JANSEN (Coordinator)  
⌚ 5 credits [lecture: 24h, tutorial classes: 12h, project: 100h] 📅 second term 🗨 English