Objectives

The field of biotherapy relies on the use of molecules designed from a living organism. Biotherapies comprise cell and tissue therapy, gene therapy and therapies using human molecules synthesized by eukaryotic cells or bacteria, as antibodies and bioactive proteins. This domain has considerably evolved during the recent years thanks to the research progress in vectorology, stem cells, biomaterials, omics and computational biology. Future researchers in this field require a strong education in the molecular basis of physio-pathological processes to develop new biotherapy strategies. The aim of the international master «From fundamental molecular biosciences to biotherapies» is to offer a strong training in fundamental molecular biosciences applied to biotherapies through a multidisciplinary approach given by renowned partner universities.

Program Overview

The program, taught in English, consists of four semesters (120 ECTS) and offers students the opportunity, in addition to a high quality education in Molecular Biosciences delivered at Sorbonne Université (Paris), to choose a specialisation among the different fields of biotherapies in different partner universities:

**Cancer biology:** Heidelberg university (Germany)

**Immunology and biotherapies:** Prague Charles university (Czech republic), Sao Paulo university (Brasil)

**Stem cell, Development and Evolution:** Lisbon university (Portugal), Heidelberg university (Germany)

**Bioinformatics for health sciences:** Heidelberg university (Germany) and Barcelona Pompeu Fabra university (Spain).

**Fundamental molecular biosciences in biotherapies:** Sorbonne Université (Paris)

The program’s objective is to attract motivated students to a fully integrated Master course that combines the best elements of existing courses by the consortium members. Graduates will emerge with critical understanding of basic and applied scientific knowledge and excellent professional and personal skills. The specializations allow students to obtain original multiple high qualifications in complementary disciplines and generate career opportunities in academic research, pharmaceutical industry and biomedical research with an emphasis on molecular aspects of biotherapies.
### Program Structure

#### FIRST YEAR

**Semester 1: Sorbonne Université (30 ECTS)**

- Practical training in molecular and cellular biology: 12 ECTS
- Fundamental Molecular Biosciences: 15 ECTS
- Language course (English for French students, French for foreign students): 3 ECTS

**Semester 2: 12 ECTS theoretical courses, 18 ECTS junior internship (30 ECTS)**

1. **Option Cancer biology:**
   - Heidelberg University
   - Course: Molecular principles of cancer development

2. **Option Immunology and biotherapies:**
   - Prague Charles University
   - Courses: Advances in Immunology, Animal models in Immunology, Clinical cases in immunology, Innate immunity, Medical virology and viral pathogenesis, Biomedical research, Molecules of Life & Mutations
   - Sao Paulo University
   - Courses: Fundamental Immunology, Onco-Immunology

3. **Option Stem cells, Development and Evolution:**
   - Lisbon University
   - Courses: Genes and molecules in development, Stem cell biology and technology, Evolution and Development, Developmental and Comparative neurobiology, Evolution and Development of the immune system
   - Heidelberg University
   - Courses: Developmental genetics and epigenetics, Stem cell biology

4. **Option Bioinformatics for health sciences:**
   - Heidelberg University
   - Course: Systems Biology « Systems Cell Biology »
   - Barcelona Pompeu Fabra university
   - Courses: Computational systems biology, Applied genomics: genome-phenome analysis in human health

5. **Option: Fundamental molecular biosciences in biotherapies:**
   - Sorbonne université

#### SECOND YEAR

**Semester 3: Sorbonne Université (30 ECTS)**

1. **Introductory course**
   - Transverse and translationnal approaches applied to biotherapies: 6 ECTS

2. **Specialisation course**
   - The specialisation course depends on the option chosen in M1
   - Molecular biology of the cell: Institut Pasteur
   - Stem cell biology: Sorbonne Université
   - Advanced course in Cell Biology: IBPC, Sorbonne Université
   - International developmental biology course: from stem cells to morphogenesis: Institut Curie/Sorbonne Université
   - Translational Immunology and biotherapies
   - Systems immunology

3. **Optional course:**
   - The optional course depends on the option chosen in M1
   - 6 ECTS

4. **Design of a research project**
   - 6 ECTS
   - Presentation of the research project that will be developed during the senior internship

**Semester 4: Sorbonne université or partner universities (30 ECTS)**

1. **Senior internship**
   - 30 ECTS
   - Senior internship abroad is mandatory for students who have chosen the M1 option: “Fundamental molecular biosciences in biotherapies”.


**Sorbonne Université pedagogic team:**
- Claire Fournier-Thibault: claire.thibault@sorbonne-universite.fr
- Charles Durand: charles.durand@sorbonne-universite.fr
- Joelle Sobzack-Thépot: joelle.sobzack-thepot@sorbonne-universite.fr
- Véronique Mateo: veronique.mateo@sorbonne-universite.fr