M2-Integrative and Systemic Immunology (I2S)

The I2S theme aims to prepare students from scientific and medical disciplines for academic and industrial research careers in integrative immunology, at the interface between experimentation and modelling.

High-throughput technologies, such as massive sequencing (genome, exome, transcriptome, adaptive immune receptor repertoire or microbiome) as well as multi-parametric cytometry (flow or mass) or mass spectrometry (proteome and metabolome), are increasingly used in biology. Applied to immunology, these tools allow a better understanding of the complexity of the immune response and its failures in a pathological context and open up new avenues for the identification of biomarkers (diagnostic or prognostic) or new therapeutic targets.

This course will provide an understanding of the challenges and problems of these new technological approaches, as well as an in-depth knowledge of analytical tools and their interest for fundamental or translational research. The training may also have a "professionalizing" objective aimed at preparing future graduates for integration in industry. This option will be based on courses linked to the world of business and entrepreneurship as well as a 6-month internship in a company.

The training can be provided in French or English depending on the attendees.

PUBLIC:

Scientific students enrolled in the Master's programme, physicians, pharmacists, veterinarians, engineers with the necessary prerequisites for a total of 20 students. This course is also open to continuous training.

ORGANISATION:

The programme includes the following courses:

Course	credits
I2P specialisation (From November to January)	12 ECTS
Scientific Analysis (From November to January)	6 ECTS
Scientific Project (November-December)	6 ECTS
Opening (From September to May)	6 ECTS
6-month laboratory internship (From January to June)	30 ECTS

I2S specialisation course (MU5BM535, 12 ECTS)

An in-depth presentation of high-throughput technologies, modalities and tools of translational medicine and some current applications of integrative immunology approaches will be offered in the form of lectures given by actors in integrative and systems immunology research as well as by experts in mathematical, statistical and computer modelling applied to biology. Practical workshops will complement the theoretical training, including advanced training in flow cytometry and the analysis of massive data from different sources (transcriptome, immune repertoire, immunophenotyping, microbiome, etc.).

Scientific analysis course (MU5BM051, 6 ECTS)

This course aims at developing scientific analysis skills in the field of integrative immunology research. The students will have to demonstrate their capacity to analyse, synthesize and criticize rigorously scientific documents in connection with the topic (article, research project, patents, ...).

Scientific project course (MU5BM091, 6 ECTS)

This course aims to train students in the design and implementation of an original scientific research project based on the analysis of public data and supported by an in-depth bibliographic analysis. This activity, carried out in pairs or triples, will be initiated at the beginning of the academic year.

Opening course (of your choice, 6 ECTS)

Within the framework of the general curriculum of the "Molecular and Cellular Biology" Master's degree, students have the possibility of freely choosing one or several opening courses for a total credit of 6 ECTS (1 x 6 ECTS) or (2 x 3 ECTS. This choice must allow students to complete their Master's training in order to deepen their knowledge within the course or to open up to related or complementary themes/skills. Depending on the opening UE chosen, students will be able to acquire training that will enable them to pursue a doctoral course or immediate professional integration.

Internship (5BMSO7, 30 ECTS)

The internship of a maximum duration of 6 months will be initiated at the end of the course (mid-January), possibly starting before the beginning of the course, when possible, within a research team (in France or abroad) in an academic or a company. The project that will be entrusted to the student trainee must be related to the theme of the course, with the objective of answering a fundamental or translational immunology problem at the interface between experimentation and modelling.

A detailed report of the activity will be requested and will be defended orally in June or September.

CONTACTS

Head of teaching: Dr Encarnita Mariotti-Ferrandiz
encarnita.mariotti@sorbonne-universite.fr

Pedagogical assistant: Belma CELIK
belma.celik@sorbonne-universite.fr
Tel: +33 1 44 27 20 27
Fax: 01 44 27 34 25