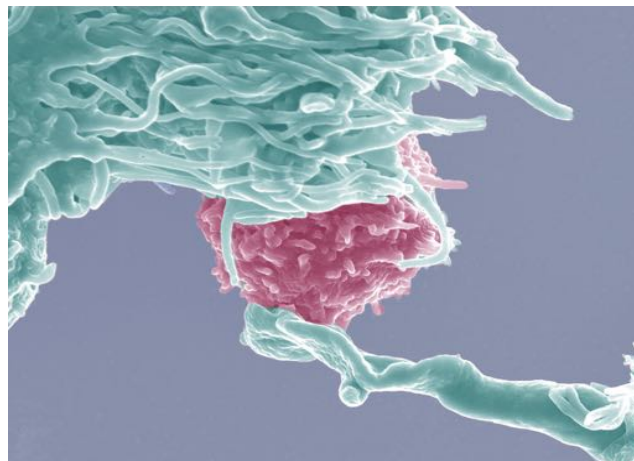


# ADVANCED IMMUNOLOGY COURSE

2015 - 2016

MASTERS (M2) OF UNIVERSITIES PARIS V, VI, VII



# PROGRAM

FROM NOVEMBER 16<sup>TH</sup> 2015 TO JANUARY 8<sup>TH</sup> 2016

# ADVANCED IMMUNOLOGY COURSE

2015-2016

MASTERS (M2) OF UNIVERSITIES PARIS V, VI, VII

## THEMES

- > DEVELOPMENT OF THE IMMUNE SYSTEM
- > MOLECULAR BASIS FOR ANTIGEN RECOGNITION BY IMMUNOGLOBULIN AND T CELL RECEPTORS
- > REPERTOIRE SELECTION AND AUTO-IMMUNITY
- > LYMPHOCYTE INTERACTIONS
- > IMMUNE RESPONSES AND IMMUNOTHERAPY
- > INNATE IMMUNE SYSTEM

*The Course takes place at the*

*- TEACHING CENTER - PAVILLON LOUIS MARTIN -  
28, rue du Docteur Roux  
75724 Paris Cedex 15*

PRACTICAL COURSES :      TEACHING CENTER - PAVILLON LOUIS MARTIN - GROUND FLOOR

LECTURES AND SEMINARS :    - ROOM N° 2 - TEACHING CENTER - PAVILLON LOUIS MARTIN

-  
Bâtiment Social - Module 3 - Room 4  
Centre d'Immunologie Humaine Bâtiment Metchnikoff  
Centre d'Immunologie Humaine Bâtiment François Jacob

# Program of the Practical Work

## Week 1

### Monday, November 16

All	08:30 - 09:30	Reception of students and INTRODUCTION TO THE COURSE
	09:30 - 10:00	Presentation of students
	10:00 - 11:00	INTRODUCTION TO THE PRACTICAL WORK – Milena HASAN
	11:00 - 12:00	Presentation of security rules – Milena HASAN, Murielle ALMOUSSA, Isabelle LEQUEUTRE
	12:00-13:00	<i>lunch</i>
	13:00 - 14:00	SEMINAR CYTOMETRY – Sophie NOVAULT
	14:00- 18:00	Reception of blood; prepare reagents, cytometry staining

### Tuesday, November 17

Group 1+2	09:00-10:00	Set up of the cytometer
Group 1	10:00-11:30	Sample acquisition
Group 2	10:00-11:30	Prepare an article for Journal Club
Group 2	11:30-13:00	Sample acquisition
Group 1	11:30-13:00	Prepare an article for Journal Club
Group 1+2	13:00-14:00	<i>lunch</i>
Group 1+2	14:00-18:00	FlowJo data analysis
Group 3+4	09:00-13:00	FlowJo data analysis
Group 3+4	13:00-14:00	<i>lunch</i>
Group 3+4	14:00-15:00	Set up of the cytometer
Group 3	15:00-16:30	Sample acquisition
Group 4	15:00-16:30	Prepare an article for Journal Club
Group 4	16:30-18:00	Sample acquisition
Group 3	16:30-18:00	Prepare an article for Journal Club

### Wednesday, November 18

Group 1+2	09:00-15:00	Reception of blood; PBMC isolation, cell counting, freezing down of PBMC and plasma, immune stimulation of PBMC
Group 1+2	15:00-16:30	run remaining two panels on Canto
Group 1+2	16:30-18:00	FlowJo data analysis
All	13:00-14:00	<i>lunch</i>
Group 3+4	12:00-18:00	Reception of blood; PBMC isolation, cell counting, freezing down of PBMC and plasma, immune stimulation of PBMC
Group 3+4	09:00-10:30	run remaining two panels on Canto
Group 3+4	10:30-12:00	FlowJo data analysis

### **Thursday, November 19**

All	09:00-12:00	finalize Flow Jo data analysis
	12:00-13:00	<i>lunch</i>
Freezing of	13:00-18:00	Collection of supernatants after O/N stimulation; stimulated PBMC and supernatants Staining of PBMC for imaging cytometry

### **Friday, November 20**

All RNA	09:00-12:00	Extraction of RNA, quantification and freezing down of RNA
	12:00-13:00	<i>lunch</i>
	13:00-18:00	Reverse transcription, PCR and separation of amplified fragments on agarose gel

### **Saturday, November 21**

Report writing

## ***Week 2***

### **Monday, November 23**

Group 1+2	09:00-10:00	SEMINAR ISX – Milena HASAN
Group 1+2	10:00-11:00	Put in culture PBMC for Seahorse & cell sorting
Group 1	11:00-14:00	ISX experiment
Group 2	11:00-14:00	Prepare an article for Journal Club
Group 1+2	14:00-15:00	<i>lunch</i>
Group 1	15:00-18:00	Prepare an article for Journal Club
Group 2	15:00-18:00	ISX experiment
Group 3+4	09:00-10:00	SEMINAR ELISA/MAGPIX - Sandrine SCHMUTZ
Group 3+4	10:00-13:00	MagPix
Group 3+4	13:00-14:00	<i>lunch</i>
Group 3+4	14:00-17:00	MagPix

### **Tuesday, November 24**

Group 1+2	09:00-10:00	SEMINAR ELISA/MAGPIX - Sandrine SCHMUTZ
Group 1+2	10:00-10:30	Immune stimulation of PBMC for Seahorse & cell sorting
Group 1+2	10:30-13:30	MagPix
Group 1+2	13:30-14:30	<i>lunch</i>
Group 1+2	14:30-17:30	MagPix
Group 1+2	17:30-18:30	SEMINAR SEAHORSE – Bruno CHARBIT
Group 3+4	09:00-10:00	SEMINAR ISX – Milena HASAN
Group 3+4	10:00-11:00	Put in culture PBMC for Seahorse & cell sorting
Group 3	11:00-14:00	ISX experiment
Group 4	11:00-14:00	Prepare an article for Journal Club
Group 3+4	14:00-15:00	<i>lunch</i>

Group 4	15:00-18:00	ISX experiment
Group 3	15:00-18:00	Prepare an article for Journal Club

### **Wednesday, November 25**

All	09:00-10:00	CONFERENCE „Genetic determinants of the Immune response“ - Lluís Quintana Murci
Group 1	10:00-13:00	Seahorse experiment
Group 2	10:00-13:00	ISX data analysis
Group 1+2	13:00-14:00	<i>lunch</i>
Group 2	14:00-17:00	Seahorse experiment
Group 1	14:00-17:00	ISX data analysis
Group 3+4	09:00-10:00	SEMINAR SORTING – Sophie NOVAULT
Group 3+4	10:00-10:30	Immune stimulation of PBMC for Seahorse & cell sorting
Group 3+4	10:30-13:30	Staining of cells for sorting
Group 3+4	13:30-14:30	<i>lunch</i>
Group 3+4	14:30-18:00	Single-cell sorting Single-cell RT+ preamplification

### **Thursday, November 26**

All	09:00-10:00	CONFERENCE „From translational research to personalized medicine“ - Stanislas Pol
Group 1+2	10:00-11:00	SEMINAR SORTING – Sophie NOVAULT
Group 1+2	11:00-13:30	Staining of cells for sorting
Group 1+2	13:30-14:30	<i>lunch</i>
Group 1+2	14:30-18:00	Single-cell sorting Single-cell RT+ preamplification
Group 3+4	10:00-11:00	SEMINAR SEAHORSE – Bruno CHARBIT
Group 3	11:00-14:00	Seahorse experiment
Group 4	11:00-14:00	ISX data analysis
Group 3+4	13:00-14:00	<i>lunch</i>
Group 4	14:00-17:00	Seahorse experiment
Group 3	14:00-17:00	ISX data analysis

### **Friday, November 27**

All	09:00-10:00	Seahorse data analysis
	10:00-11:00	MagPix data analysis
	11:00-12:00	Report writing
	12:00-13:00	<i>lunch</i>
Group 3	13:00-13:30	present an article: Journal Club
Group 4	13:30-14:00	present an article: Journal Club
Group 2	14:00-14:30	present an article: Journal Club
Group 2	14:30-15:00	present an article: Journal Club
All	15:00-18:00	report writing

### **Saturday, November 28**

Report writing

### **Week 3**

#### **Monday, November 30**

Group 1+2	09:00-12:30	Classical ELISA
Group 1+2	12:30-13:30	lunch
Group 1+2	13:30-17:00	Classical ELISA
Group 3+4	09:00-10:00	SEMINAR BIOMARK - Valentina LIBRI
Group 3	10:00-13:00	RT PCR/BioMark
Group 4	10:00-13:00	Report writing
Group 3+4	13:00-14:00	lunch
Group 4	14:00-17:00	RT PCR/BioMark
Group 3	14:00-17:00	Report writing

#### **Tuesday, December 1**

All	09:00-10:00	SEMINAR SEQUENCING ( <i>Mathieu Boimard, Life Technologies</i> )
	10:00- 18:00	mRNA sequencing - library preparation

#### **Wednesday, December 2**

Group 3+4	09:00-12:30	Classical ELISA
Group 3+4	12:30-13:30	lunch
Group 3+4	13:30- 17:00	Classical ELISA
Group 1+2	09:00-10:00	SEMINAR BIOMARK - Valentina LIBRI
Group 1	10:00-13:00	Report writing
Group 2	10:00-13:00	RT PCR/BioMark
Group 1+2	13:00-14:00	lunch
Group 2	14:00-17:00	RT PCR/BioMark
Group 1	14:00-17:00	Report writing

#### **Thursday, December 3**

Group 1+2	09:00-12:00	Run the chip on the sequencer
Group 3+4	09:00-12:00	Report writing
All	12:00-13:00	lunch
All	13:00-14:30	BioMark data analysis
Group 1+2	14:30-17:30	Report writing
Group 3+4	14:30-17:30	Run the chip on the sequencer

#### **Friday, December 4**

All	09:00-12:00	RNA sequencing - data analysis (QC and blast)
	12:00-13:00	lunch
	13:00-14:00	RNA sequencing - data analysis (QC and blast)
	14:00-17:00	CONFERENCE „Phylogeny of the Immune System“ - Louis du Pasquier
	17:00	farewell party

#### **Saturday, December 5**

Finalize reports

**Dead-line for submission of the reports: Sunday, December 6, midnight**

◆ 4<sup>TH</sup> WEEK ◆

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FROM MONDAY DECEMBER 7<sup>TH</sup> TO FRIDAY DECEMBER 18<sup>TH</sup> 2015

DOCTORAL SCHOOL MODULE

*"Immune System and T cell development and function"*

**MONDAY DECEMBER 7**

- |               |   |  |
|---------------|---|--|
| 9:00 - 12:00  | Stem cells, hematopoiesis and lymphopoiesis | <b>Ana CUMANO</b><br>(Institut Pasteur - Paris)      |
| 13:30 - 16:30 | The immune system homeostasis               | <b>Antonio FREITAS</b><br>(Institut Pasteur - Paris) |

**TUESDAY DECEMBER 8**

- |               |  |  |
|---------------|--|--|
| 9:00 - 12:00  | Origin of antigen receptor diversity and recombination | <b>Ludovic DERIANO</b><br>(Institut Pasteur - Paris)               |
| 13:30 - 16:30 | Thymus development                                     | <b>Thomas BOEHM</b><br>(Max-Planck Institute - Freiburg - Germany) |

**WEDNESDAY DECEMBER 9**

- |               |                              |   |
|---------------|------------------------------|---|
| 9:00 - 12:00  | Lymphoid tissue development. | <b>Tom CUPEDO</b><br>(Erasmus University, Rotterdam, The Netherlands) |
| 13:30 - 16:30 | Lymphocyte dynamics.         | <b>Philippe BOUSSO</b><br>(Institut Pasteur - Paris)                  |

**THURSDAY DECEMBER 10**

- |               |   |  |
|---------------|---|--|
| 9:00 - 12:00  | Heterogeneity of T helper cell subsets. | <b>Marc VELDHON</b><br>(Babraham Institute - Cambridge - UK) |
| 13:30 - 16:30 | Peripheral tolerance and autoimmunity.  | <b>Burkhard BECHER</b><br>(Univ. Zurich - Switzerland)       |

**FRIDAY DECEMBER 11**

- |               |   |   |
|---------------|---|---|
| 9:00 - 12:00  | $\alpha/\beta$ T cell development and selection | <b>Ludger KLEIN</b><br>(Institute for Immunology - Munich, Germany) |
| 13:30 - 16:30 | B cell selection and heterogeneity              | <b>Simon FILLATREAU</b><br>(DRFZ - Berlin, Germany)                 |

**SATURDAY DECEMBER 12**

- |              |  |   |
|--------------|--|---|
| 9:00 - 12:00 | Vaccination: the race against emerging infectious diseases | <b>Frédéric TANGY</b><br>(Institut Pasteur - Paris) |
|--------------|--|---|

**MONDAY DECEMBER 14**

**Andrés ALCOVER**  
(Institut Pasteur - Paris)

**Adrian HAYDAY**  
(Francis Crick Institute- London, UK)

**James DI SANTO**  
(Institut Pasteur - Paris)

**Philippe PIERRE**  
(Centre d'Immunologie Marseille-Luminy)

**Thierry DEFRANCE**  
(Center for Infectiology Res., Lyon)

**Miguel SOARES**  
(Gulbenkian Institute for Science, Oeiras, Portugal)

**Marc DAERON**  
(Centre d'Immunologie Marseille-Luminy)

**Alain FISCHER**  
(Univ. Paris Descartes - INSERM - Paris)

**Gerard EBERL**  
(Institut Pasteur - Paris)



**TUESDAY JANUARY 5, 2016**

**9h00 - 13h00**

**WRITTEN EXAMINATION**

**WEDNESDAY JANUARY 6**

**9:30 - 12:30**

**SEMINAR 1**

Antibodies in health and disease

*Organizers :* **Friederique JÖNSSON** (*Institut Pasteur - Paris*)  
**Hugo MOUQUET** (*Institut Pasteur - Paris*)

**14:00 - 17:00**

**SEMINAR 2**

Lymphocyte Trafficking

*Organizers:* **Béatrice BREART** (*Institut Pasteur - Paris*)  
**Emmanuel DONNADIEU** (*Institut Cochin - Paris*)

**THURSDAY JANUARY 7**

**9:30 - 12:30**

**SEMINAR 3**

Innate immunity

*Organizers :* **Jean-Pierre LEVRAUD** (*Institut Pasteur - Paris*)  
**Molly INGERSOLL** (*Institut Pasteur - Paris*)

**14:00 - 17:00**

**SEMINAR 4**

T cell responses.

*Organizers :* **Corinne TANCHOT** (*Hôpital Necker - Paris*)  
**Christine BOURGEOIS** (*Hôpital Cochin - Paris*)

**FRIDAY JANUARY 8**

**9:30 - 12:30**

**SEMINAR 5**

Lymphocyte activation and transcriptional regulation.

*Organizers :* **Christian VOSSHENRICH** (*Institut Pasteur - Paris*)  
**Jerome DELON** (*Institut Cochin - Paris*)

**14:00 -17:00**

**SEMINAR 6**

Molecular basis of B cell differentiation.

*Organizers :* **Michèle GOODHARDT** (*Hôpital St-Louis Inserm - Paris*)  
**Claude-Agnès REYNAUD** (*Univ. Paris Descartes, INSERM - Paris*)

**17:30**

**FAREWELL PARTY**

**ADVANCE IMMUNOLOGY COURSE 2015-2016**  
**EXAM**

Test	Points	M2 Immunologie Approfondie
Written test 3 subjects	100	UE Spécialisation 12 ECTS
Practical Laboratory Work (TP)		
Bibliography seminars	50	UE Analyse Scientifique 6 ECTS

**Practical Laboratory work (TP) is evaluated as follows :**

1. Daily evaluation by the TP Supervisor judging the student's investment, the quality of work provided, participation to discussions, etc.
2. A report written by each « binome », which is sent to the TP Supervisor as **pdf file, by e-mail. Dead line : Sunday, December 6, 2015 midnight.**
3. Written test the day of the exam.

**Written test : January 5<sup>th</sup>, 2016.** Three written questions,

- Subjects 1 and 2 consist on two independent series of questions related to data extracted from two published articles.
- Subject 3 : Written test concerning the TP: 10-20 questions regarding the practical work.

**Bibliography seminars:** January 6- 8<sup>th</sup>, 2016. Each student is evaluated individually according to an evaluation grid, by the supervisors of each seminar. The work carried out in common by each group is also evaluated. Guidelines are included in the program.

**Bibliography seminars**  
**(UE Analyse Scientifique (BMC551-I-A))**  
**Guidelines**

**Objectives**

The goal of these seminars is to improve the student's ability to analyze the scientific literature and to present it to others. Each student should try to capture and present the essential elements of each article, underlining the scientific question asked, the experimental approaches used, the results obtained and the main conclusions obtained. The students should then discuss what they think are the stronger and weaker points in a didactic and constructive manner. Finally, the scientific, therapeutic or technological advancements may be discussed.

**Preparation**

- Articles are chosen by the seminar advisors and are available as pdf files at the Pasteur Immunology Course web page. ([http://webcampus.pasteur.fr/display.jsp?id=c\\_13813](http://webcampus.pasteur.fr/display.jsp?id=c_13813)) via the intranet.

- The students chose a seminar theme, three to four students per seminar. It is recommended to choose a seminar subject unrelated with the subject of your Master thesis.

**- Reading:**

- **All the students of a given seminar should read all the articles proposed for that seminar.** It is recommended to start reading the articles enough ahead of time, so there is time to do some bibliography concerning the subject, and to discuss with the other students of the group as well as with the seminar advisors.

- It is important that the students contact the seminar advisors to ask questions about the different articles provided, and about the modalities for the presentation. Advisor's contact addresses are available on the course program.

**- Presentation:**

**The students present the seminars in English.**

**A "power-point" presentation of 20 min (approx) + 10 min of questions**

- An introduction on the subject helping to place the articles in the general context of the literature is prepared by each group and presented by one or several students.

- Each student presents one article.

- The experimental approaches used in each article should be understood and briefly commented. Some techniques might be new and key for the results and should be highlighted during the presentation.

- The results should be clearly described. Although the whole article should be thoroughly read and understood, it is often important not to describe all the figures during its presentation, or to present them in a different order. This helps the understanding.

- A critical analysis of the results and the conclusions has to be done. The student may discuss the results in a different manner than the article, and get to different conclusions if he (she) finds that appropriate.

- A general conclusion should be drawn underscoring the general interest of the work, its importance for the knowledge in the field, as well as the putative scientific, therapeutic or technical breakthroughs.

- A particular effort should be done to make a didactic presentation and to stimulate discussion.

- Bibliography seminars are meant to stimulate discussion between the students. Therefore, **attendance to all the seminars is mandatory.** Questions and comments from other students mostly reinforce the understanding of the presentation and the whole quality of the bibliography seminars series. Increased discussion generally increases the marks given to the students. **Be participative!**