

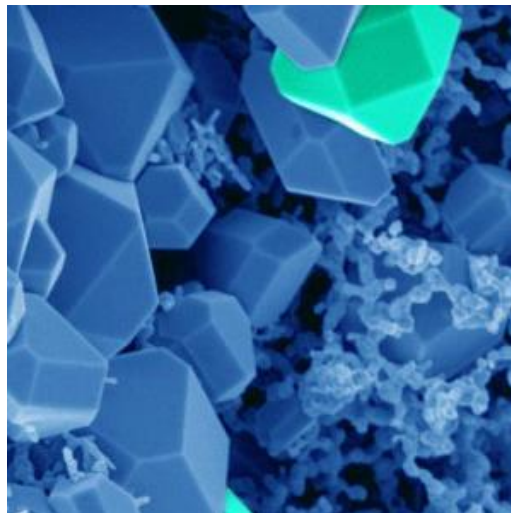


Institut Pasteur

centre d'enseignement

Pasteur course

2nd INTEGRATIVE STRUCTURAL BIOLOGY



PROGRAM 2016 - 2017

Pasteur course

2nd INTEGRATIVE STRUCTURAL BIOLOGY

2016 - 2017

(17 – 22 July, 2017)

Course Organizers

Claudine Mayer

Michael Nilges

Nicolas Wolff

Institut Pasteur

The Course
will take place at

The Institut Pasteur
28, rue du Docteur Roux
75724 PARIS Cedex 15
François Jacob - Building 26-28
Education Center (Building 06, Room 4)

Description of the course

Problems in structural biology today can very often not be solved by one technique alone, but need to be solved by a combination of methods, including **NMR, X-ray crystallography, electron microscopy, structural mass spectrometry, and SAXS**. The heterogeneous data coming from these methods need to be combined with **advanced molecular modeling** techniques. The Institut Pasteur is one of the few institutions that unites expertise in all major structural biology techniques and in molecular modeling on one site. The goal of the course is to provide young scientists that have more specialized knowledge in one of the techniques an overview over the broad range of modern structural methods available. Special emphasis will be given to computational approaches to integrate data (such as IMP, ARIA, ...).

The course is principally aimed at the mature graduate student / postdoctoral level, but applications from scientists at all levels are encouraged. The course will consist of lectures, which will give introductions into the principles and limitations of the different techniques, and practical work on data analysis with the major structure refinement / modeling programs.

Pasteur course - 2nd Integrative Structural Biology

Sunday, July 16 | Arrival of participants

20:00 Informal get together / **Dinner**

Monday, July 17 | Protein production Chair: Bruno Miroux

Amphitheatre François Jacob

9:00 - 9:30 *General presentation of the course* **Michael Nilges** (Paris)
including presentation of the Education center and Scholarship offices
(10 minutes each)

9:30 - 10:00 1 slide presentation of the participants

10:00 - 10:30 *Coffee break*

10:30 - 11:30 *Integrative structural biology* **Michael Nilges** (Paris)

11:30 - 12:15 *The Protein Data Bank* **Matthew Conroy** (Cambridge)

12:15 - 14:00 *Lunch*

14:00 - 14:45 *Detergents and biochemistry of membrane proteins* **Cécile Breyton** (Grenoble)

14:45 - 15:30 *The use of SMALPs, an alternative to stabilise membrane protein for biophysical studies* **Vincent Postis** (Leeds)

15:30 - 16:15 *Reconstitution of Membrane Protein for functional studies* **Martin Picard** (Paris)

16:15 - 16:45 *Coffee break*

16:45 - 17:30 *Gene design and codon metrics* **Gregory Boel** (Paris)

17:30 - 18:15 *Protein production in E. coli* **Bruno Miroux** (Paris)

18:30 - 20:30 *Dinner (Buffet) / Poster session (Modules 1, 2 and 3, building 6)*

Tuesday, July 18 | X-ray diffraction Chair: Isabelle Broutin

Amphitheatre François Jacob

9:00 - 9:30 *No structure without crystal, the long road to get it* **Isabelle Broutin** (Paris)

9:30 - 10:30 *How the crystal got its spots* **Pierre Legrand** (Saclay)

10:30 - 10:45 *Coffee break*

10:45 - 11:45 *From diffraction data to initial phases and from phases to model building and validation* **Marc Delarue** (Paris)

11:45 - 12:15 *The contribution of crystallography in an integrated structural approach: case of the study of bacterial efflux pumps involved in antibiotic resistance* **Isabelle Broutin** (Paris)

12:15 - 12:45 *Chaperoning 5S RNA assembly* **Nicolas Leulliot** (Paris)

13:00 - 14:30 *Lunch*

Bioinformatics room 4 (building 6)

14:30 - 18:00 *Practical session
From data processing to structure refinement* **Marco Bellinzoni** (Paris)

Wednesday, July 19 | Electron microscopy | Chair: Dorit Hanein

Amphitheatre François Jacob

9:00 - 10:00 *An overview of cryo-EM* **Dorit Hanein** (San Diego)

10:00 - 11:00 *Image processing basics* **Niels Volkmann** (San Diego)

11:00 - 11:30 *Coffee break*

11:30 - 12:00 *Visualizing macromolecular machines* **Rémi Fronzes** (Paris)

12:00 - 12:30 *Protein Structures and Dynamics from Cryo-EM* **Gunnar Schroeder** (Jülich)

12:30 - 14:00 *Lunch*

Bioinformatics room 4 (building 6)

14:00 - 18:00 *Practical session
Image processing and visualization* **Daniel Castano-Diez** (Basel)
Paula Perez Navarro (Basel)
Niels Volkmann (San Diego)
Dorit Hanein (San Diego)

18:30 - 19:30 *Dinner (Buffet) / Poster session (Modules 1, 2 and 3, building 6)*

Thursday, July 20 | Liquid/solid NMR | Chair: Sophie Zinn-Justin

Amphitheatre François Jacob

9:00 - 10:00 *Principles of NMR
structure determination et dynamics* **Sophie Zinn-Justin** (Gif-sur-Yvette)

10:00 - 10:45 *NMR of biomolecular interactions* **Nadia Izadi-Pruneyre** (Paris)

10:45 - 11:15 *Coffee break*

11:15 - 12:15 *Solid state and its applications* **Paul Schanda** (Grenoble)

12:30 - 13:45 *Lunch*

13:45 - 14:45 *Structure calculation from NMR data* **Benjamin Bardiaux** (Paris)

Bioinformatics room 4 (building 6)

15:00 - 17:00 Practical session
Structure calculation from NMR data with ARIA **Benjamin Bardiaux** (Paris)

Amphitheatre François Jacob

17:30 - 18:30 *Unraveling protein function
by NMR spectroscopy* **Wolfgang Peti** (Providence)

18:45 - 19:30 *Dinner (Buffet) / Posters (Modules 1, 2 and 3, building 6)*

Friday, July 21

SAXS - Biophysics

Chair: Patrice Vachette

Amphitheatre François Jacob

9:00 - 10:30 *Solution X-ray Scattering
from Biological macromolecules (1)* **Patrice Vachette** (Orsay)

10:30 - 11:00 *Coffee break*

11:00 - 12:30 *Solution X-ray Scattering
from Biological macromolecules (2)* **Patrice Vachette** (Orsay)

12:30 - 14:00 *Lunch*

Bioinformatics room 4 (building 6)

14:00 - 14:15 *Quality control of purified proteins* **Sébastien Brulé** (Paris)

14:00 - 17:00 *Tutorials - SAXS data analysis and modeling*
Aurélien Thureau (Saclay)
Patrice Vachette (Orsay)

Saturday, July 22

Mass spectrometry

Chair: Julia Chamot-Rooke

Amphitheatre François Jacob

9:00 - 9:30 *Mass Spectrometry in Structural Biology:
an Introduction* **Julia Chamot-Rooke** (Paris)

9:30 - 10:30 *Structural probing of protein complexes by
protein cross-linking and mass spectrometry* **Florian Stengel** (Konstanz)

10:30 - 11:00 *Coffee break*

11:00 - 12:00 *Insight into protein structure and dynamics utilizing backbone amide hydrogen/deuterium exchange monitored by mass spectrometry* **Thomas Jorgensen** (Southern Denmark)

12:00 - 13:00 *Higher-order protein structure by native MS and ion mobility* **Frank Sobott** (Antwerp)

13:00 - 14:00 *Lunch (Buffet)*

Bioinformatics room 4 (building 6)

14:00 - 16:00 Practical session: IMP Tutorial **Riccardo Pellarin** (Paris)

16:30 - 16:45 *Coffee break*

16:45 - 17:45 Round table

17:45 - 18:00 *Conclusion of the course* **Michael Nilges** (Paris)

19:00 - 20:00 *Free evening*

Sunday, July 23 | **Departure**

Coffee every afternoon around 16:00 during practical sessions

ADDRESS DETAILS

Course Organizers

Claudine Mayer

Institut Pasteur

Microbiologie Structurale unit

Email: claudine.mayer@pasteur.fr

Michael Nilges

Institut Pasteur

Bio-Informatique structurale unit

Email: Michael.nilges@pasteur.fr

Nicolas Wolff

Institut Pasteur

Résonance magnétique nucléaire des biomolécules unit

Email: Nicolas.wolff@pasteur.fr

LECTURERS

Surname	Name	Email	From
BARDIAUX	Benjamin	benjamin.bardiaux@pasteur.fr	Institut Pasteur Unité de Bio-Informatique Structurale Paris - France
BELLINZONI	Marco	marco.bellinzoni@pasteur.fr	Institut Pasteur Unité de Microbiologie Structurale Paris - France
BOEL	Gregory	boel@ibpc.fr	Institut de Biologie Physico- Chimique Paris - France
BREYTON	Cécile	Cecile.breyton@ibs.fr	Institut de Biologie Structurale Grenoble - France
BROUTIN	Isabelle	isabelle.broutin@parisdescartes.fr	Paris V University Paris - France
BRULE	Sébastien	sebastien.brule@pasteur.fr	Institut Pasteur, Biophysique moléculaire Paris - France
CASTANO-DIEZ	Daniel	daniel.castano@unibas.ch	Bio-EM Lab at C-CINA Biozentrum, University of Basel Basel - Suisse
CHAMOT-ROOKE	Julia	julia.chamot-rooke@pasteur.fr	Institut Pasteur Unité de Spectrométrie de Masse Structurale et Protéomique/ CNRS Paris - France
CONROY	Matthew	conroy@ebi.ac.uk	Protein data Bank in Europe (PDBe) -UK
DELARUE	Marc	marc.delarue@pasteur.fr	Institut Pasteur – Dynamique structurale des macromolécules Paris - France
FRONZES	Rémy	r.fronzes@iecb.u-bordeaux.fr	Laboratoire de Microbiologie Fondamentale et Pathogénicité UMR-CNRS 5234 – Institut Européen de Chimie et Biologie Pessac - France
HANEIN	Dorit	dorithanein@gmail.com	SBP - USA
IZADI-PRUNEYRE	Nadia	nadia.izadi@pasteur.fr	Institut Pasteur Unité de Résonance Magnétique Nucléaire des Biomolécules / CNRS Paris - France

Surname	Name	Email	From
JORGENSEN	Thomas	tjdj@bmb.sdu.dk	University of Syddansk Denmark
LEGRAND	Pierre	pierre.legrand@synchrotron-soleil.fr	SOLEIL Gif-sur-Yvette - France
LEULLIOT	Nicolas	nicolas.leulliot@parisdescartes.fr	Laboratoire de Cristallographie et RMN Biologiques - LCRB - UMR 8015 CNRS - Université Paris Descartes Paris - France
MIROUX	Bruno	bmiroux@gmail.com	IBPC Paris - France
PELLARIN	Ricardo	ricardo.pellarin@pasteur.fr	Institut Pasteur Bioinformatique structurale Paris - France
PERREZ NAVARRO	Paula	pau.pereznavarro@unibas.ch	Bio-EM Lab at C-CINA Biozentrum, University of Basel Basel - Suisse
PETI	Wolfgang	wolfgangpeti@email.arizona.edu	University of Arizona USA
PICARD	Martin	picard@ibpc.fr	IBPC Paris - France
POSTIS	Vincent	V.L.G.Postis@leeds.ac.uk	University of Leeds UK
SCHANDA	Paul	paul.schanda@ibs.fr	IBS/Biomolecular NMR group Grenoble - France
SCHROEDER	Gunnar	gu.schroeder@fz-juelich.de	Institute of Complex Systems Jülich - Allemagne
SOBOTT	Frank	frank.sobott@uantwerpen.be	University of Antwerp Belgique
STENGEL	Florian	florian.stengel@uni-konstanz.de	Konstanz University Allemagne
THUREAUX	Aurélien	aurelien.thureau@synchrotron-soleil.fr	SOLEIL Gif-sur-Yvette - France
VACHETTE	Patrice	patrice.vachette@i2bc.paris-saclay.fr	I2BC Orsay - France
VOLKMANN	Niels	niels@hailmail.net	Stanford Burnham Prebys Medical Discovery Institute USA
ZINN-JUSTIN	Sophie	Sophie.ZINN@cea.fr	IBITECS CEA Gif-sur-Yvette - France

CONTACTS

ADMINISTRATION INSTITUT PASTEUR

Education Center

Sylvie GARNERO

Building 09C – Pavillon Louis Martin – 1st floor

Tél : +33 (0)1 40 61 38 04

Fax : +33 (0)1 40 61 38 99

Email : cours@pasteur.fr

Scholar Office

Sylvie MALOT

Building 13

Room Saint-Joseph de Cluny

Tel : +33 (0) 45 68 81 41

FAX : 33 (0)1-45-68-84-40

Email : enseignement@pasteur.fr