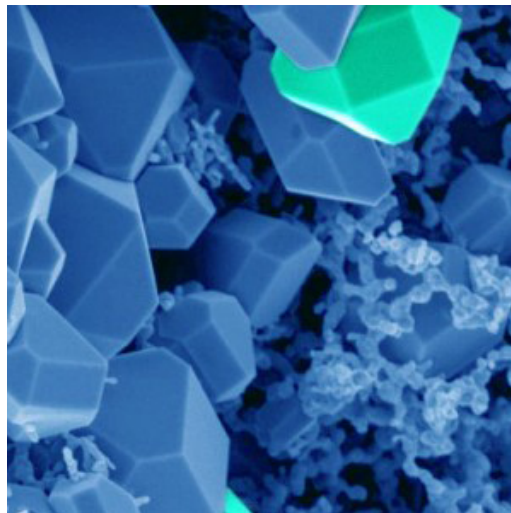


Pasteur course

3rd INTEGRATIVE STRUCTURAL BIOLOGY



PROGRAM 2017 - 2018

Pasteur course

3rd INTEGRATIVE STRUCTURAL BIOLOGY

2017 - 2018

(16 - 20 July, 2018)

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 – 3rd Integrative Structural Biology

Sunday, July 15	Arrival of participants
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20:00 Informal get together / **Dinner**

Monday, July 16	Protein production	Chair: Bruno Miroux
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Amphitheatre François Jacob

9:00 - 10:00 Welcome to the participants and Administrative information

10:00 - 10:30 *General presentation of the course* **Michael Nilges** (Paris)

10:30 - 11:00 1 slide presentation of the participants

11:00 - 11:45 *Heterologous production of complex samples* **Imre Berger** (Bristol)

Bioinformatics room 4 (building 6)

12:00 - 12:45 *Gene design and codon metrics* **Gregory Boel** (Paris)

12:45 - 14:00 Lunch

14:00 - 14:45 *Microbial expression systems for membrane proteins* **Bruno Miroux** (Paris)

14:45 - 15:30 *Amphipols nanodisc and SMA for membrane protein stabilization and purification* **Manuela Zoonen** (Paris)

15:30 - 16:15 *Membrane Protein Reconstitution* **Martin Picard** (Paris)

16:15 - 16:45 Coffee break

16:45 - 17:30 *Quality control and characterization of purified proteins-1* **Bertrand Raynal** (Paris)

17:30 - 18:15 *Quality control and characterization of purified proteins-2* **Sébastien Brulé** (Paris)

18:30 - 20:30 Dinner (Buffet) / Poster session

Tuesday, July 17	X-ray diffraction	Chair: Isabelle Broutin
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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	<i>From diffraction data to initial phases and from phases to model building and validation</i>	Marc Delarue (Paris)
11:45 - 12:15	<i>How bacterial RND transporters efflux antibiotics out of the cell</i>	Isabelle Broutin (Paris)
12:15 - 12:45	<i>Integrated structural biology for ribosome biogenesis understanding</i>	Magali Blaud (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)
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Wednesday, July 18 | Liquid/solid NMR | Chair: Sophie Zinn-Justin

Amphitheatre François Jacob

9:00 - 10:00	<i>Principles of NMR structure determination et dynamics by liquid state NMR</i>	Sophie Zinn-Justin (Gif-sur-Yvette)
10:00 - 10:45	<i>Biomolecular interactions by liquid state NMR</i>	Nadia Izadi-Pruneyre (Paris)

10:45 - 11:15 *Coffee break*

11:15 - 12:15	<i>Cutting-edge solid-state NMR to elucidate insoluble protein structures</i>	Birgit Habenstein (Bordeaux)
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12:30 - 13:45 *Lunch*

13:45 - 14:45	<i>From NMR data to structures: principles and contributions to integrative studies of large assemblies</i>	Benjamin Bardiaux (Paris)
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Bioinformatics room 4 (building 6)

15:00 - 18:00	HADDOCK Introduction and Practical session	Alexandre Bonvin (Utrecht)
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18:30 - 20:30 *Dinner (Buffet) / Poster session*

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

9:00 - 10:00	<i>An overview of cryo-EM</i>	Dorit Hanein (San Diego)
10:00 - 11:00	<i>Image processing basics</i>	Niels Volkmann (San Diego)
11:00 - 11:30	<i>Coffee break</i>	

11:30 - 12:00	<i>Visualizing macromolecular machines</i>	Christo Gatsogiannis (Dortmund)
12:00 - 12:30	<i>Protein Structures and Dynamics from Cryo-EM</i>	Chiara Rapisarda (Bordeaux)

12:30 - 14:00 *Lunch*

Bioinformatics room 4 (building 6)

14:00 - 18:00	Practical session	Christo Gatsogiannis (Dortmund)
	High resolution single particle cryoEM using SPHIRE	Toshi Moriya (Dortmund)

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

Friday, July 20	SAXS – Biophysics	Chair: Patrice Vachette
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Amphitheatre François Jacob

9:00 - 10:30	<i>Solution X-ray Scattering from Biological macromolecules (1)</i>	Javier Perez (Orsay)
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10:30 - 11:00 *Coffee break*

11:00 - 12:30	<i>Tutorials – SAXS data analysis And modeling</i>	Aurelien Thureau (Orsay) Patrice Vachette (Orsay)
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12:30 - 14:00 *Lunch*

Bioinformatics room 4 (building 6)

14:00 - 15:30	Integrative structural biology	Michael Nilges (Paris)
15:30 - 16:30	Data deposition and validation at the Worldwide Protein Data Bank (wwPDB)	Aleksandras Gutmanas (Hinxton)
16:30 - 18:00	PDB Practical session	Aleksandras Gutmanas (Hinxton)

Saturday, July 21	Mass spectrometry	Chair: Julia Chamot-Rooke
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Amphitheatre François Jacob

9:00 - 9:30	<i>Mass Spectrometry in Structural Biology: an Introduction</i>	Julia Chamot-Rooke (Paris)
9:30 - 10:30	<i>Structural probing of protein complexes by protein cross-linking and mass spectrometry</i>	Florian Stengel (Konstanz)

10:30 - 11:00 *Coffee break*

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| 11:00 - 12:00 | <i>Insight into protein structure and dynamics utilizing backbone amide hydrogen/deuterium exchange monitored by mass spectrometry</i> | Thomas Jorgensen (Southern Denmark) |
| 12:00 - 13:00 | <i>Higher-order protein structure by native MS and ion mobility</i> | Frank Sobott (Antwerp) |

13:00 - 14:00 Lunch (Buffet)

Bioinformatics room 4 (building 6)

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| 14:00 - 16:00 | Practical session: IMP Tutorial | Ricardo Pellarin (Paris) |
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16:30 - 16:45 Coffee break

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| 16:45 - 17:45 | Round table | |
| 17:45 - 18:00 | <i>Conclusion of the course</i> | Michael Nilges (Paris) |

Sunday, July 23	Departure
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Coffee every afternoon around 16:00 during practical sessions