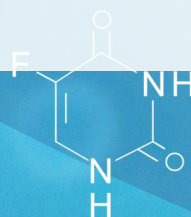


Technology Department core facilities

Portfolio of technological training

April 2023



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GENERAL INTRODUCTION

The Technology Department (DT) is part of the Department of Scientific Affairs. Its aim is to ensure that scientists have access to the highest quality technological infrastructure to further enhance the Institut Pasteur's excellence in research. It provides outstanding shared facilities, including a unique array of expertise, equipment, powerful technologies and biological resources.

These strategic resources are housed in four centers:

- The C2RT: the Center for Technological Resources and Research (C2RT) comprises several UTechS (technology and service units) and core facilities. Fields as varied as omics; design and production of biomolecules and their structural analysis; imaging; cell sorting and phenotyping; phenotypic screening; microfluidics and 3D cell culture are covered.
- The C2RA: support with animal research and animal models is provided through the Center for Animal Resources and Research (C2RA), allowing animal experiments to be conducted to the highest ethical and regulatory standards.
- The C2RI: the Center for Informatics Resources and Research (C2RI) provides support to the Institut Pasteur's research units and core facilities in areas including computational biology, informatics and scientific computing, data analysis and management.
- The CRBIP: access to a wide range of biological resources and related expertise is provided by the Biological Resource Centre (CRBIP), a multidisciplinary biobank housing collections of microbial organisms and human samples.

A key mission of the DT is to guarantee fair and open access to STEM (science, technology, engineering and mathematics) teaching, training and education in advanced life science technologies and methods. Training is designed to give Institut Pasteur staff (PhD students, postdoctoral fellows and researchers) the opportunity to boost their career prospects. Therefore, in partnership with the Education Department and the Human Resources Department, the DT offers a variety of strategic technology courses providing researchers with access to certified training.

This brochure provides a list of certifying courses offered by the DT to help you advance your research programs and career, together with information on how to apply for the courses best suited to your needs.

Technology course tracks

The instructional tracks designed by the Technology Department's core facilities are separated into two categories: 1) basic training courses; and 2) advanced courses that can be chosen according to individual needs. The initial generic training course covers essential basic knowledge and concepts on the technologies and methodologies available in the core facility to develop a full understanding of all considerations involved.

The advanced courses can be accessed directly subject to core facility acceptance. On a case by case basis, trainees who have shown knowledge of basic concepts covered previously in their career and have followed an advanced course are eligible for certification.

Nevertheless, learners are strongly recommended to take the full track (basic + at least one advanced course) to achieve consistent training and certification. Certification is awarded at the core facility's discretion.

The different tracks and training programs are summarized in the following pages.

Technology curriculum and certification at the Institut Pasteur

The goal is to enable PhD core facility users to certify expertise developed at the Institut Pasteur through the completion of training compatible with doctoral school recommendations. Core facilities evaluate 4 levels of expertise (Beginner, Autonomous, Advanced, Expert/Designer). Certification starts from level 2 (Autonomous).

- **Beginner** (No certification): allows you to work on a specific pipeline under the supervision of an Advanced or Expert person. You are expected to:
 - Undertake the basic training for the use of the technology/method
- **Autonomous** (Certification): allows you to work autonomously on a specific pipeline. You are expected to:
 - Have sufficient theoretical/academic knowledge of the specific workflow
 - Have reached the Beginner Level
 - Have followed an advanced training course with validation of knowledge/skills
 - Be independent in the use of a method/protocol/instrument/technical procedure
 - Be able to evaluate the quality of results critically
- **Advanced** (Certification): allows you to demonstrate effective use of a specific pipeline for biomedical research. You are expected to:
 - Have reached the independent level
 - Be able to transpose your knowledge to other biological problems
 - Have mastered the system/technique to its full potential
 - Provide relevant and independent analysis of your collected data
- **Expert/Designer** (Certification): allows you to demonstrate comprehensive expertise in the field. You are expected to:
 - Have reached the Advanced level
 - Be able to coach/train other users
 - Be able to detect/anticipate/evaluate a problem in the system
 - Have cross-cutting knowledge of several technologies/methods implemented in the DT's core facility (at least one that can address the type of issue they might have)
 - Be able to conduct technology watch activities

In the case of animal experimentation: specific qualifications are awarded to comply with legal requirements. A booklet summarizing these modules will be provided to users upon request.

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Photo credits: Institut Pasteur's library / François Gardy, AdobeStock.

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Design achievement: Communication department / Image Service / Jean-François Charles.



OMICS, PROTEOMICS, METABOLOMICS AND SINGLE CELL

C2RT

Technological core facilities

Introduction

The Biomics Core Facility is the C2RT structure at Institut Pasteur for Next Generation Sequencing. The objective of Biomics is to support you in the preparation of NGS experiment and that you become autonomous in the use of certain sequencers and certain equipments useful for the preparation of libraries and sequencing.

Basic course

No basic course available, advanced course are availble for all users.

Advanced courses

Bioanalyzer

Description: This online training course teaches how to perform electrophoresis with specific chips and how to drive the Bioanalyzers' «2100 expert» control software to start the experiment, produce and analyse the results.

Length: 2 h online

Covaris

Description: This online training course teaches how to perform DNA fragmentation and how to drive the Sonolab control software to start the experiment. This is completed with on site pratical.

Length: 2 h online + 30min on site

NestSeq500

Description: The purpose of this training is to become familiar with the Nextseq 500 sequencer. You will learn how to prepare libraries for a run on the NextSeq500, the main steps to launch a sequencing run on the Nextseq 500 and how validate the quality of the run.

Length: 3 h online + 30 min on site

MiniSeq

Description: The purpose of this training is to become familiar with the MiniSeq sequencer. You will learn how to prepare libraries for a run on the MiniSeq, the main steps to launch



a sequencing run on the MiniSeq and how to validate the quality of the run.

Length: 2 h online + 30 min on site

ISeq100

Description: The purpose of this training is to become familiar with the ISeq100 sequencer. You will learn how to prepare libraries for a run on the ISeq100, the main steps to launch a sequencing run on the MiniSeq and how to validate the quality of the run.

Length: 1 h 30 hour online

Advanced course: BioAnalyzer

Aim	The goal of the course is to become autonomous in the use of the Bioanalyzer and to have independent access to it.
Summary	The Bioanalyzer 2100 is a small device dedicated to miniaturised electrophoresis to analyze DNA, RNA and even proteins on specific chips. This online training course teaches how to perform electrophoresis with specific chips and how to drive the Bioanalyzers' «2100 expert» control software to start the experiment, produce and analyze the results.
Duration	2 hours
Theoretical program	Part1: presentation of the system Part2: preparation of a chip Part3: troubleshooting
Period	All year long
Language	English
Pre-Requirement	None
Associated course	None
Site of the training	Online
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	QCM after the online training
Number of Participants	No limit
Registration	https://moocs.pasteur.fr
Head of the course	Laurence Ma and Valérie Briolat
Contact	Biomics-Bioanalyzer@pasteur.fr

Advanced course: COVARIS

Aim	The goal of the course is to become autonomous in the use of the Covaris and to have independent access to it.
Summary	Covaris is recognized as the reference for DNA fragmentation. Adaptive Focused Acoustics technology (AFA™) allows precise control of the mechanical fragmentation of DNA. This online training course teaches how to perform DNA fragmentation and how to drive the Sonolab control software to start the experiment.
Duration	2 hours online + 30 min on site
Theoretical program	I- Principle of the Covaris II- Use of the Covaris (with Sonolab software)
Practical program	A Biomics trainer guides you for the 1st use of the Covaris using your material.
Period	All year long
Language	English
Pre-Requirement	None
Associated course	None
Site of the practical training	Biomics platform Building Veil (14)
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	QCM and first use of Covaris
Number of Participants	No limit
Registration	Theorical part: https://moocs.pasteur.fr After validation of the theoretical training, send an email to biomics-covaris@pasteur.fr
Head of the course	Laurence Motreff
Contact	Biomics-Covaris@pasteur.fr (Juliana Pipoli, Georges Haustant)

Advanced course: NextSeq500

Aim	The goal of the course is to become autonomous in the use of the NextSeq 500 and to have independent access to it.
Summary	The NextSeq 500 is a medium throughput NGS sequencer using the same types of libraries as other Illumina sequencers. The purpose of this training is to become familiar with the Nextseq 500 sequencer. You will learn how to prepare libraries for a run on the NextSeq500, the main steps to launch a sequencing run on the Nextseq 500 and how validate the quality of the run.
Duration	3 hours online + 30 min on site
Theoretical program	I- System presentation II- Launch a run on the NextSeq500 III- Quality control of a sequencing run
Practical program	A Biomics trainer guides you to start the first sequencing run on the NextSeq500, using your first pool of libraries and your sequencing reagents
Period	All year long
Language	English
Pre-Requirement	None
Associated course	None
Site of the practical training	Biomics platform Building Veil (14)
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	QCM and first use of the NextSeq500
Number of Participants	No limit
Registration	Theorical part: https://moocs.pasteur.fr After validation of the theoretical training, send an email to biomics-nextseq@pasteur.fr
Head of the course	Juliana Pipoli
Contact	biomics-nextseq@pasteur.fr (Juliana Pipoli, Marc Monot)

Advanced course: MiniSeq

<i>Aim</i>	The goal of the course is to become autonomous in the use of the MiniSeq and to have independent access to it.
<i>Summary</i>	The MiniSeq is a low throughput NGS sequencer using the same types of libraries as other Illumina sequencers. The purpose of this training is to become familiar with the MiniSeq sequencer. You will learn how to prepare libraries for a run on the MiniSeq, the main steps to launch a sequencing run on the MiniSeq and how validate the quality of the run.
<i>Duration</i>	2 hours online + 30 min on site
<i>Theoretical program</i>	I- Principle of MiniSeq sequencer II- Miniseq use (start the run) III- Validate the quality of the run
<i>Practical program</i>	A Biomics trainer guides you to start the first sequencing run on the MiniSeq, using your first pool of libraries and your sequencing reagentsl.
<i>Period</i>	All year long
<i>Language</i>	English
<i>Pre-Requirement</i>	None
<i>Associated course</i>	None
<i>Site of the practical training</i>	Biomics platform Building Veil (14)
<i>Eligible participants</i>	PhD students, technicians, engineers, researchers
<i>Criterium of validation</i>	QCM and first use of the MiniSeq
<i>Number of Participants</i>	No limit
<i>Registration</i>	Theorical part: https://moocs.pasteur.fr After validation of the theoretical training, send an email to Biomics-MiniSeq@pasteur.fr
<i>Head of the course</i>	Laurence Motreff, Élodie Turc
<i>Contact</i>	Biomics-Covaris@pasteur.fr (Élodie Turc, Laurence Ma)

Advanced course: ISeq100

<i>Aim</i>	The goal of the course is to become autonomous in the use of the ISeq100 and to have independent access to it.
<i>Summary</i>	The ISeq 100 is a low output NGS sequencer using the same types of libraries as the other Illumina sequencers. The purpose of this training is to become familiar with the ISeq100 sequencer. You will learn how to prepare libraries for a run on the ISeq100, the main steps to launch a sequencing run on the MiniSeq and how validate the quality of the run.
<i>Duration</i>	1h30
<i>Theoretical program</i>	I- Principle of ISeq100 sequencer II- ISeq100 use (start the run) III- Validate the quality of the run
<i>Period</i>	All year long
<i>Language</i>	English
<i>Pre-Requirement</i>	None
<i>Associated course</i>	None
<i>Site of the training</i>	Online
<i>Eligible participants</i>	PhD students, technicians, engineers, researchers
<i>Criterium of validation</i>	QCM after the online training
<i>Number of Participants</i>	No limit
<i>Registration</i>	https://moocs.pasteur.fr
<i>Head of the course</i>	Laurence Motreff, Élodie Turc
<i>Contact</i>	Biomics-Covaris@pasteur.fr (Élodie Turc, Laurence Ma)

Introduction

The Mass Spectrometry for Biology (MSBio) Unit aims at developing service and research activities in mass spectrometry for the analysis of proteins.

It comprises a facility, providing mainly service in bottom-up proteomics (large scale analysis of peptides after protein enzymatic digestion) MSBio is equipped with the latest generation of high-resolution mass spectrometers: Orbitrap Q-Exactive Plus, Orbitrap Q-Exactive HF, Orbitrap Fusion Lumos and Eclipse (Thermo Fisher Scientific).



Basic course

Protein Mass Spectrometry

Description: In this course module, we propose to introduce the general concepts of mass spectrometry, with a general presentation of mass spectrometers, their operation, and their evolution over time. The increasing capabilities of these instruments will be presented as well as the latest generation of high-resolution mass spectrometers. The principles of peptide and protein analysis by mass spectrometry and the different fragmentation modes will be introduced. Then, quantitative proteomic approaches will be presented with examples of applications highlighting the importance of these quantitative proteomic approaches especially in the field of infectious diseases.

Length: 2 days, 10 hours total

Advanced courses

Protein ID by bottom-up proteomics

Description: More specific topics will be addressed in these dedicated sessions such as a more in-depth introduction to the different modes of fragmentation of peptides and proteins, sample preparation for a proteomic study and the analysis of posttranslational modifications. Bioinformatics and statistical analysis of data will also be covered.

Length: 2 days, 12 hours total

Proteoform identification by top-down proteomics

Description: This advance course will cover all the theoretical and practical aspects of top-down proteomics experiments.

Length: 2 days, 12 hours total

PTM Identification

Description: Starting from Thermo RAW files that represent LC-MS/MS experiments, participants will gain a theoretical and practical understanding of the MSFragger / Philosopher / FragPipe toolkit for matching peptide sequences to tandem mass spectra, resulting in tables of identified spectra per protein for multiple LC-MS/MS experiments. While the demonstrations will emphasize bottom-up proteomics, the differences with top-down identification will also be discussed.

Length: 1 day, 4 hours total

Labeled and label-free quantitation (LFQ)

Description: Starting from Thermo RAW files that represent LC-MS/MS experiments, participants will gain a theoretical and practical understanding of the different tools to identify and quantify protein from LFQ experiment.

Length: 1 day, 4 hours total

Basic course: Protein Mass Spectrometry

Aim	The aim of the course is to provide basic knowledge/update on mass spectrometry (MS)-based proteomic approaches.
Summary	In this course module, we propose to introduce the general concepts of mass spectrometry, with a general presentation of mass spectrometers, their operation, and their evolution over time. The increasing capabilities of these instruments will be presented as well as the latest generation of high-resolution mass spectrometers. The principles of peptide and protein analysis by mass spectrometry and the different fragmentation modes will be introduced. Then, quantitative proteomic approaches will be presented with examples of applications highlighting the importance of these quantitative proteomic approaches especially in the field of infectious diseases.
Duration	2 days, 10 hours total
Theoretical program	Part 1: Protein ID with bottom-up proteomics Part 2: Proteoform ID with top-down proteomics Part 3: PTM identification Part 4: Labeled and label-free quantitation
Period	1 st trimester and/or 3 rd trimester
Language	French / English depending on the request
Pre-Requirement	Chemistry, biochemistry knowledge
Associated course	Bioinformatics, R package
Site of the training	UTechS MSBio, 2 nd floor building François Jacob
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	Regular class attendance and QCM
Number of Participants	8-10 places
Registration	msbio@pasteur.fr
Head of the course	Mariette Matondo and Julia Chamot-Rooke Trainers: Mariette Matondo (Bottom-up), Julia Chamot-Rooke/Megan Gant (Top-Down), Magdalena Gil (Identification), Magdalena Gil (Quantitation)
Contact	mariette.matondo@pasteur.fr

Advanced course: Protein ID by bottom-up proteomics

«The whole is greater than the sum of its parts.» (Aristote)

Aim	The aim of the course is to provide basic knowledge/update on bottom-up proteomic approaches.
Summary	More specific topics will be addressed in these dedicated sessions such as a more in-depth introduction to the different modes of fragmentation of peptides and proteins, sample preparation for a proteomic study and the analysis of posttranslational modifications. Bioinformatics and statistical analysis of data will also be covered.
Duration	2 days, 12 hours total
Theoretical program	Potential lecture titles: 1) Introduction to biological mass spectrometry 2) Mass spec-compatible sample preparation 3) Fractionation and separation 4) Ionization, mass analysis, and dissociation 5) How does a tandem mass spectrum reveal peptide sequence?
Practical program	Protein digestion, peptide clean-up, data acquisition Potential exercises: 1) For a given UniProt entry, where are known disulfides? What lengths are the tryptic peptides? 2) Given a feature map for a RAW file, associate the RT values with the hydrophobicity gradient. 3) Convert a RAW file to mzML. How many MS and MS/MS scans does it contain, for what charges? What type of dissociation was employed? 4) For a given species or disease, use OmicsDI to find extant data sets in ProteomeXchange.
Period	Running on demand
Language	French / English depending on the request
Pre-Requirement	Basic knowledge in chemistry and biochemistry
Associated course	R Package, bioinformatics and statistics
Site of the training	UTechS MSBio, 2 nd floor building François Jacob
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	Regular class attendance and expert evaluation
Number of Participants	5-8 places
Registration	msbio@pasteur.fr
Head of the course	Mariette Matondo Trainer: Magdalena Gil
Contact	mariette.matondo@pasteur.fr

Advanced course: Proteoform identification by top-down proteomics

«Humpty Dumpty sat on a wall, Humpty Dumpty had a great fall. Four-score Men and Four-score more, Could not make Humpty Dumpty where he was before.» (Samuel Arnold, 1797)

Aim	Introduce the concept of proteoforms and how they can be addressed using top-down proteomics. This course requires the previous one on bottom-up proteomics to be done previously. Participants will understand the specific challenges for identifying MS/MS representing proteoforms rather than shotgun peptides.
Summary	This advanced course will cover all the theoretical and practical aspects of top-down proteomics experiments.
Duration	2 days, 12 hours total
Theoretical program	Potential lecture titles: 1) Defining proteoforms: the value of preserving connectivity 2) Sample handling and LC separation for proteoforms 3) Fragmentation of proteoforms for improved sequence coverage 4) Data analysis in top-down proteomics: the basics
Practical program	Sample preparation, data acquisition, data analysis Potential exercises: 1) Prepare a sample for further LC-MS analysis 2) Set up a basic LC-MS analysis for proteoforms analysis (simple mixture) 3) Analyze top-down data, identify proteoforms, associate scoring, PTMs
Period	Running on demand
Language	French / English depending on the request
Pre-Requirement	Basic knowledge in chemistry and biochemistry
Associated course	Bottom-up proteomics
Site of the training	UTechS MSBio, 2 nd floor building François Jacob
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	Regular class attendance and expert evaluation
Number of Participants	5 places
Registration	msbio@pasteur.fr
Head of the course	Julia Chamot-Rooke Trainers: Julia Chamot-Rooke, Megan Gant, Karen Druart
Contact	julia.chamot-rooke@pasteur.fr

Advanced course: PTM Identification

“Contrariwise, if it was so, it might be; and if it were so, it would be; but as it isn’t, it ain’t. That’s logic.” (Lewis Carroll)

Aim	Participants will understand the role of database search engines, FDR control in resulting peptide identifications, and protein inference for transforming LC-MS/MS data sets into identified peptides and proteins. They will gain experience configuring and operating these software tools.
Summary	Starting from Thermo RAW files that represent LC-MS/MS experiments, participants will gain a theoretical and practical understanding of the MSFragger / Philosopher / FragPipe toolkit for matching peptide sequences to tandem mass spectra, resulting in tables of identified spectra per protein for multiple LC-MS/MS experiments. While the demonstrations will emphasize bottom-up proteomics, the differences with top-down identification will also be discussed.
Duration	1 day, 4 hours total
Theoretical program	Lectures will include these topics: 1) Understanding database search algorithms for MS/MS identification 2) The target-decoy technique for controlling aggregate error in peptide-spectrum matches 3) Protein inference through parsimony and sequence database selection 4) Detecting specified post-translational modifications and unknown mass shifts
Practical program	Participants will conduct database search and post-processing on a set of RAW files employing the configuration and sequence database (all files provided by the instructor). This program will require that the students bring laptops with at least 8 GB of RAM and a 64-bit Java Virtual Machine
Period	At least once a year
Language	French / English depending on the request
Pre-Requirement	Participants should be familiar with alteration of text files and will gain experience in using the command line. Prior exposure to biostatistics will be helpful
Associated course	R Package, bioinformatics and statistics
Site of the training	UTechS MSBio, 2 nd floor building François Jacob
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	Regular class attendance and successful completion of identification workflow on individual or shared computers
Number of Participants	Up to 10 places
Registration	msbio@pasteur.fr
Head of the course	Initial offering: David L. Tabb; Subsequent years: Quentin Gai Gianetto
Contact	mariette.matondo@pasteur.fr

Advanced course: Labeled and label-free quantitation

“It is the quality of our work which will please God and not the quantity.” (Mahatma Gandhi)

Aim	Participants will understand how to perform a LFQ experiment and how to analyse the data.
Summary	Starting from Thermo RAW files that represent LC-MS/MS experiments, participants will gain a theoretical and practical understanding of the LFQ relative e proteomics quantification pipeline.
Duration	1 day, 4 hours total
Theoretical program	Potential lecture titles: 1) Concepts for quantitation: spectral counts, extracted ion chromatograms, and isotopic difference 2) Modes of mass spectrometry: shotgun sampling, targeted MS, and data-independent acquisition 3) Labeling strategies: metabolic, SILAC, and isobaric labels 4) Difference testing, volcano plots, and multiple testing correction
Practical program	Sample preparation, data acquisition and analysis Potential exercises: 1) Given a table of spectral counts for two cohorts, evaluate Fisher Exact Test and Poisson tests for finding differences (data from iPRG 2009, using provided R script) 2) Employ Perseus on MaxQuant intensities via iBAQ
Period	Running on demand
Language	French / English depending on the request
Pre-Requirement	Basic knowledge in Rpackage, biochemistry, chemistry y
Associated course	Bioinformatccs ans statistical course
Site of the training	UTechS MSBio, 2 nd floor building François Jacob
Eligible participants	PhD students, technicians, engineers, researchers
Criterium of validation	Regular class attendance and expert evaluation
Number of Participants	5 places
Registration	msbio@pasteur.fr
Head of the course	Mariette Matondo
Contact	mariette.matondo@pasteur.fr

Cytometry and Biomarkers Training Path

Introduction

The CB UTechS facilitates biomedical research through state-of-the-art technologies. Our instruments allow cell phenotyping and sorting, protein and RNA profiling and single cell OMICS. The UTechS provides basic and advanced training for autonomous use of instruments and annual teaching courses).

Basic courses

New User Training

Description: The training provides an overview of the CB UTechS's team, mission, organisation, activities, access policies, general information on the laboratories and available equipment, software and training.

Length: 45 min

SOPs

Description: The training provides information required for safe and optimized autonomous use of the P2+ laboratory. Introduction to the basics of functioning of the P2+ laboratory – risks, rules, waste management, organization of space and equipment reservation.

Length: 2 h

Training

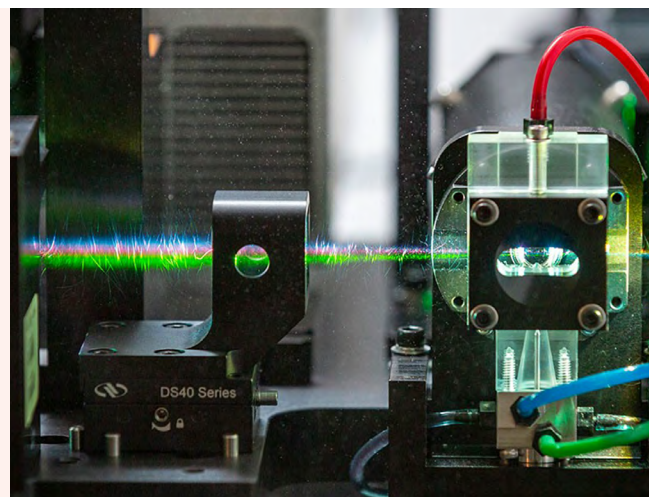
FUNCTIONAL CELL ASSAYS AND CELL PHENOTYPING

Okomera (Okomera)

Description: The instrument allows high-throughput microfluidics-based establishment and analysis of 3D spheroids.

Comprised of a seminar, hands-on and data analysis sessions, the training covers sample preparation, use of technology, export and analysis of data, as well as various possible applications.

Length: 4



Incucyte SX-5 (Sartorius)

Description: The instrument is used for live-content imaging and enables various applications (e.g. cell migration, 3D spheroid analysis, cell proliferation...).

Comprised of a seminar, hands-on and data analysis sessions, the training covers sample preparation, use of technology, export and analysis of data, as well as of various possible applications.

Length: 4 h

Seahorse (Agilent)

Description: The instrument is used for measuring cellular metabolism (glycolysis and mitochondrial respiration). Comprised of a seminar, hands-on and data analysis sessions, the training covers sample preparation, use of technology, export and analysis of data, as well as of various possible applications.

Length: 4 h

MicDrop (in-house microfluidics) + ODIN

Description: The station is composed of several components that together allow for image- and fluorescence-based single cell (and microbe) sorting. Comprised of a seminar and a hands-on session, the training covers sample preparation and use of technology, as well as various possible applications.

Length: 4 h

Xvivo (Biospherix)

Description: The training covers all aspects important for autonomous use of the Xvivo hypoxia chamber, from working under sterile conditions to daily maintenance procedures.

Length: 1 h

TRANSCRIPTOMIC PROFILING

Nanostring prep station and nCounter

Description: The instrument is used for quantification of up to 800 transcripts, by multiplex direct hybridization of RNA. Comprised of a seminar, hands-on and data analysis sessions, the training covers sample preparation, use of the technology and data analysis.

Length: 8 h

SINGLE CELL TRANSCRIPTOMICS

Biomark (Fluidigm)

Description: The instrument is used for microfluidics-based multiplex real-time PCR. Comprised of a seminar, hands-on and data analysis sessions, this training covers all theoretical and practical aspects of sample preparation and autonomous use of the technology, as well as basics of data analysis.

Length: 5 h

10xChromium Controller (10xGenomics)

Description: The instrument is used for droplet-based separation of individual cells and barcoding of scRNA. Comprised of a seminar and hands-on session, this training covers sample preparation and autonomous use of the instrument, up to cDNA amplification, including quantification and quality control steps of the amplified cDNA.

Length: 8 h

Visium (10xGenomics)

Description: The pipeline is used for full spatial transcriptomics, with 55µm spatial resolution. The training is composed of a seminar and hands-on session. It covers all steps of the pipeline, from the transfer of tissue slices to the proprietary slides, through library preparation, to quantification and quality control of generated cDNA and library.

Length: 8 h

Single cell library prep

Description: The method is an integrated part of the preparation of samples for single-cell RNA sequencing, upon single-cell partitioning and RNA barcoding. The training covers all steps of library preparation, quantification, and quality control.

Length: 10 h

MARS-seq

Description: The pipeline is used for scRNA-sequencing. The training is comprised of a seminar and hands-on session and covers all steps of sample preparation for downstream scRNA-Seq by plate-based approach. It includes the use of the Mantis (Formulatrix) dispenser and the Bravo (Agilent) pipetting robot.

Length: 12 h

CellenOne (Cellenion)

Description: The instrument is used for pressure-free single-cell separation and dispensing based on fluorescence in the image. The training is comprised of a seminar and hands-on session and covers sample preparation, use of technology, and possible downstream applications (e.g. scRNA-Seq, sc proteomics).

Length: 6 h

IMMUNOASSAY-BASED PROTEIN PROFILING

Bioplex200 (Biorad) + DropArray (Curiox)

Description: The xMAP technology allows simultaneous quantification of >100 proteins based on immunoassays. Comprised of a seminar, hands-on and data analysis sessions the training covers sample preparation, use of technology, export and analysis of data, as well as various possible applications.

Length: 8 h

SP-X (Quanterix)

Description: The instrument enables ultrasensitive multiplex quantification of proteins from biological samples. Comprised of a seminar, hands-on and data analysis sessions, the training covers sample preparation, use of technology, export and analysis of data, as well as various possible applications.

Length: 8 h

Simoa HD-X (Quanterix)

Description: The technology is based on digital ELISA and enables ultrasensitive (fM) detection of proteins. Comprised of a seminar, hands-on and data analysis sessions, the training covers sample preparation, use of technology, export and analysis of data, as well as various possible applications.

Length: 6 h

Isolight (Isoplexis)

Description: The instrument is used for multiplex identification of single cell secretome. Comprised of a seminar, hands-on and data analysis sessions, the training covers sample preparation, use of technology, export and analysis of data, as well as various possible applications.

Length: 6 h

FLOW CYTOMETRY

Basic cytometry for beginners

Description: Introduction to principles of flow cytometry and cell sorting. Basic principles; theoretical presentation of optics, fluidics and electronics; compensations theory; populations and gates strategy.

Length: 4 h

Cytoflex analyzer (Beckman Coulter)

Description: Provide basic knowledge on the use of Cytoflex and its software, required for autonomous use of the acquisition technology and data analysis.

Length: 3 h

Fortessa/Symphony A5 (BD)

Description: Provide basic knowledge on the use of the LSR Fortessa and/or the FACSymphony and the Diva Software, required for autonomous use of the technology and data analysis.

Length: 7 h

ID7000 Spectral Cytometry (Sony)

Description: Provide basic knowledge on the use of the ID7000 and its software, required for autonomous use of the acquisition technology and data analysis.

Length: 5 h

NanoCytometry (Nano FCM)

Description: Provide basic knowledge on the use of the LSR Fortessa and/or the FACSymphony and the Diva Software, required for autonomous use of the technology and data analysis.

Length: 3 h

Cell sorters ARIAIII, Fusion, S6 (BD)

Description: Provide basic knowledge on the use of the FACS Aria III/ Fusion / S6 Sorters and the Diva Software, required for autonomous use of the sorting technology and data analysis.

Length: 7 h

MultiMACS / AutoMACS (Miltenyi)

Description: Provide basic knowledge on the use of the AutoMACS; daily maintenance procedures; replacement of columns.

Length: 1 h

MARKII Imaging Cytometer (Cytek)

Description: The instrument allows high-throughput analysis of cells in suspension by imaging cytometry, enabled by merging spatial information with fluorescent signal intensity. Comprised of a seminar, hands-on and data analysis sessions, the training covers all steps from sample preparation, use of technology, to export and analysis of data. It also provides an overview of various applications.

Length: 8 h

Advanced Cytometry

Description: Overview of the most recent knowledge in panel design in regards with the instruments available for high dimensional analysis as well as existing tools for data analysis.

Length: 10 h

DATA ANALYSIS

FlowJo analysis software (BD)

Description: Provide basic knowledge and overview on the use of FlowJo software.

Length: 5 h

**Advanced Training:
Unsupervised Analysis**

Description: Provide overview of the existing plugins, how to install and to use them, application with a concrete example.

Length: 5 h

SCHNAPPs (RNA-Seq data analysis)

Description: Overview of the graphical user interface dedicated to data analysis of single cell RNAseq data, called SCHNAPPs. The training explains how to load data, perform quality control and preprocessing steps, and analyze the data using dimension reduction, clustering, and differential gene expression analysis.

Length: 2 h

Annual teaching courses

Fundamentals of Flow Cytometry

Description: The course provides theoretical and hands-on training for all steps of flow cytometry experiment, from the panel design, sample staining, data acquisition to data analysis and cell sorting, using state-of-the-art technological solutions.

Length: ~30 h

Single Cell Gene Expression and Beyond

Description: The course provides theoretical and hands-on training for all steps of high-throughput single-cell profiling, from the single-cell sample and library preparation to data analysis, using state-of-the-art technological solutions.

Length: 40 h

Practical course for Advanced Immunology M2 course (with the Teaching Center and Universities Paris Cite and Sorbonne)

Description: During this practical course the students are taught on how to select and use state-of-the-art technologies for characterizing immune responses in human peripheral blood. It comprises seminars, wetlab and data analysis sessions.

Length: 3 weeks

Training: Okomera

<i>Aim</i>	This course provides all information to use Okomera, a microfluidic-based tool for cell seeding and generation of miniature 3D spheroids. Covers the sample preparation, the use of the technology, and sessions for data analysis.
<i>Summary</i>	Provide knowledge on the use of the sample preparation and use of Okomera and its software, required for autonomous use of the technology.
<i>Duration</i>	1 day, 4 h total
<i>Theoretical program</i>	Presentation of the Okomera technology
<i>Practical program</i>	Presentation of droplet microfluidics, Experiment modalities on the system Experiment set up
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, SOP's
<i>Associated course</i>	PBI light microscopy
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform the maintenance procedures (fluidics start-up, shutdown), to perform a chip loading, to proceed the cleaning procedure between users.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Laura Barrio Cano
<i>Contact</i>	laura.barrio.cano@pasteur.fr

Training: Incucyte

<i>Aim</i>	This course provides all information to use IncuCyte SX5. Covers the sample preparation, the different uses of the technology and the different modules available (chemotaxis, organoids, ATP, Scratch wound, Neurotrack and Cell-by-cell) and sessions for data analysis.
<i>Summary</i>	Provide knowledge on the sample preparation and use of the technology and its software, as well as the analysis of data.
<i>Duration</i>	1 day, 4 h total
<i>Theoretical program</i>	Presentation of the Incucyte technology: optics, electronics
<i>Practical program</i>	How to set up experiment (selection of antibodies/reagent, selection of vessels and Optical module, preparation of cells) Basic features of IncuCyte 2021A software (masks and statistical analysis) Set up the acquisition with IncuCyte 2021A software (Define vessel, template, interval, fluorescence exposition, unmixing). Run a scan on demand: troubleshooting Schedule and Run the acquisition on the IncuCyte (4 to 24h) Analyse data using IncuCyte 2021A software: <ul style="list-style-type: none"> • Search and View scanned vessels; • Edit and Save processing definition for the image collection; • Launch Analysis Job to the entire scanned data; • Create statistical report; • Export data (image + graph)
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform the full experiment, including the set-up, acquisition, and analysis of data, as well as to export images/videos or statistic files.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Laura Barrio Cano, Esma Karkeni
<i>Contact</i>	laura.barrio-cano@pasteur.fr , esma.karkeni@pasteur.fr

Training: Seahorse

<i>Aim</i>	This course provides all information to use Seahorse XFe96. Covers the sample preparation, hands-on session to perform a typical assay and data analysis.
<i>Summary</i>	Provide basic knowledge on the use of Seahorse technology and its software, required for autonomous use of the machine and for data analysis.
<i>Duration</i>	1 day, 4 h total
<i>Theoretical program</i>	Introduction to the XF Instruments and the technology
<i>Practical program</i>	<p>Overview of material, cells and instrument. XF Mito Stress Test or Glycolytic Rate Assay preparation and run. XF Data Analysis: Discussion of analysis tools:</p> <ul style="list-style-type: none"> • Data display, Plate display, Graphing tools and Tips, Data and Graphing display options, Percent of baseline response and normalized data • Importing and exporting data, Excel output of XF data, Catalog features, Default options and changes of these
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, SOP's
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform an experiment and to export report file.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Laura Barrio Cano
<i>Contact</i>	laura.barrio_cano@pasteur.fr

Training: MicDrop

<i>Aim</i>	Provide knowledge on droplet microfluidics, encapsulation of cells for fluorescence and image based-sorting for a variety of single cell downstream applications. Covers the sample preparation, key features of chip design, the use of the technology, and troubleshooting.
<i>Summary</i>	Provide basic knowledge on the use of MicDrop and its software, required for autonomous use of the technology.
<i>Duration</i>	1 day, 4 h total
<i>Theoretical program</i>	Presentation of droplet microfluidics, experiment modalities on the system
<i>Practical program</i>	Presentation of droplet microfluidics, Chip design needs Experiment set up
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	PBI, microscopy
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform the maintenance procedures (fluidics start-up, fluidics shut-down), to perform droplet encapsulation and/or sorting.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Laura Barrio Cano
<i>Contact</i>	laura.barrio-cano@pasteur.fr

Training: Xvivo

<i>Aim</i>	This course teaches how to use the Xvivo hypoxia chamber, how to set up the atmosphere parameters for its control, how to work in sterility and daily maintenance procedures.
<i>Summary</i>	Provides basic knowledge on the use of Xvivo hypoxia chamber; work in sterility and daily maintenance procedures; replacement of gloves.
<i>Duration</i>	1 h
<i>Practical program</i>	Presentation of Xvivo system, parts and software configuration of environment conditions. How to maintain sterility on introducing material and cleaning, reports exportation. Practical, glove exchange
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, SOPs
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to configure the environmental conditions for the experiment, reports exportation.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Laura Barrio Cano
<i>Contact</i>	laura.barrio-cano@pasteur.fr

Training: Nanostring prepstation and nCounter

<i>Aim</i>	This course provides knowledge of the nCounter technology, which allows the quantification of up to 800 transcripts, by direct RNA hybridization. This theoretical-practical course covers sample preparation and handling the robots and includes the guidelines for data analysis.
<i>Summary</i>	Provide knowledge on the sample preparation, use of the technology, and data analysis.
<i>Duration</i>	2 days, 8 h total
<i>Theoretical program</i>	Theoretical presentation of the technology Theoretical presentation of the Digital Analyzer nCounter
<i>Practical program</i>	Preparation of samples for the overnight incubation (Hybridization step) Set up and launch of the PrepStation for 3 hours Preparation of the Digital Analyzer Set up the cartridge acquisition parameters and load library file Launch of the acquisition for 5 hours Data analysis on the nSolver software
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform basic maintenance, to set-up, acquire and analyse an experiment.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Carolina Moraes Cabé
<i>Contact</i>	carolina.moraes-cabe@pasteur.fr

Training: Biomark

<i>Aim</i>	This course provides knowledge of the instrument and hands-on for microfluidics-based multiplex real-time PCR, and covers the sample preparation, the use of the technology, and sessions for data analysis.
<i>Summary</i>	Provide knowledge on the use of Biomark, Fluidigm acquisition, and analysis software, required for autonomous use of the technology and data export.
<i>Duration</i>	5 h
<i>Theoretical program</i>	Presentation of the functioning of the Biomark technology
<i>Practical program</i>	Hands-on Biomark, performing priming and loading of the chip Analysis of results
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform basic maintenance, to set-up, acquire and analyse an experiment be able to load a microfluidic chip (IFC), operate Biomark, and export data with Fluidigm analysis software.
<i>Number of Participants</i>	1-6 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Carolina Moraes Cabé
<i>Contact</i>	carolina.moraes-cabe@pasteur.fr

Training: 10X Chromium

<i>Aim</i>	This course provides all information required for sample preparation and autonomous use of the 10X controller and includes hands-on steps for cDNA amplification, including quantification and quality control steps of the amplified cDNA.
<i>Summary</i>	Provide knowledge on the use of 10X technology, cell separation on 10X controller, cDNA amplification, quantification, and quality control of amplified cDNA.
<i>Duration</i>	2 days, 8 h total
<i>Theoretical program</i>	Presentation of functioning of the 10X technology
<i>Practical program</i>	10X chip loading and run. Collection of emulsion RT reaction cDNA purification cDNA QC on Bioanalyzer and Qubit
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	Single cell library preparation
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to load a microfluidic 10X chip, prepare and QC cDNA.
<i>Number of Participants</i>	1-2 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Carolina Moraes Cabé
<i>Contact</i>	carolina.moraes-cabe@pasteur.fr

Training: Visium

<i>Aim</i>	This course offers knowledge of Spatial Transcriptomics and provides information for tissue sample preparation and specifications for cutting and mounting of slices in the Visium slides, imaging, generation of spatially barcoded cDNA, and QC of the cDNA. This course is performed in collaboration with the Histopathology Platform.
<i>Summary</i>	Provide knowledge on the use of 10X spatial transcriptomics, to perform RT reaction in the slide, quantification, and quality control of cDNA.
<i>Duration</i>	2 days, 5 h total
<i>Theoretical program</i>	Presentation of Visium Spatial transcriptomics
<i>Practical program</i>	Tissue mount on the slide (Histopathology Platform) H&E staining cDNA amplification cDNA QC on Bioanalyzer and Qubit
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	Single cell library preparation
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform basic maintenance, to set-up, acquire and analyse an experiment be able to load a microfluidic chip (IFC), operate Biomark, and export data with Fluidigm analysis software.
<i>Number of Participants</i>	1-6 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Carolina Moraes Cabé, Laura Barrio Cano
<i>Contact</i>	carolina.moraes-cabe@pasteur.fr , laura.barrio_cano@pasteur.fr

Training: Single cell library prep

<i>Aim</i>	This course is an integrated part of single-cell pipelines, and covers all steps of library preparation, quantification, and quality control for Next-Generation Sequencing (NGS).
<i>Summary</i>	Provide basic knowledge on library preparation, quantification and quality control.
<i>Duration</i>	1 day, 10 h total
<i>Practical program</i>	Library preparation Library quantification and QC on Bioanalyzer and Qubit
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated courses</i>	10X Chromium and Visium
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to prepare, quantify, and QC single cell library.
<i>Number of Participants</i>	1-3 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Carolina Moraes Cabé
<i>Contact</i>	carolina.moraes-cabe@pasteur.fr

Training: MARS-Seq

<i>Aim</i>	This course shows how to perform index sorting and massive parallel single-cell RNA sequencing in multiwell plates (MARS-Seq). all information required for capture plates and sample preparation, autonomous use of Bravo (Agilent) and Mantis (Formulatrix) dispensers, cDNA amplification, library preparation and quality control. The training is comprised of a seminar and hands-on session and covers all steps of MARS-Seq.
<i>Summary</i>	Provide knowledge to perform MARS-Seq assays, autonomous use of Bravo and Mantis robots to perform RT in 384 well plates, and library preparation, quantification and quality control of the library.
<i>Duration</i>	4 days, 12 h total
<i>Practical program</i>	SOP presentation Capture plate preparation Single-cell barcoding and cDNA pooling and cleaning. Libraries amplification Libraries preparation for sequencing
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform basic maintenance, to set-up, acquire and analyse an experiment be able to load a microfluidic chip (IFC), operate Biomark, and export data with Fluidigm analysis software.
<i>Number of Participants</i>	1-2 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Laura Barrio Cano
<i>Contact</i>	laura.barrio_cano@pasteur.fr

Training: Bioplex / DropArray

<i>Aim</i>	This course provides all information to use the Bioplex 200 and the Droparray. Covers the sample preparation, the use of the machines and data analysis.
<i>Summary</i>	Provide knowledge on xMAP technology, use of Bio-Plex200, troubleshooting, software, export of data, analysis of data.
<i>Duration</i>	8 h
<i>Theoretical program</i>	Presentation X-Map technology and DropArray machine (meeting room)
<i>Practical program</i>	Preparation of the plate (P2+ laboratory), and procedures for the DropArray Procedures for the Bio-Plex, calibration, programming of the reading and launch the plate reading Analysis of data: Viewing results, edit standard curves, edit protocol, export data
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, SOP's
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform the basic maintenance procedures, to set-up, acquire and analyze an experiment and to export excel files.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Esma Karkeni
<i>Contact</i>	esma.karkeni@pasteur.fr

Training: SP-X

<i>Aim</i>	This course provides all information to use the SP-X. Covers the sample preparation, the use of the SP-X and the washer and data analysis.
<i>Summary</i>	Provide knowledge on immunoassays, sample preparation and use of SP-X, assay workflow, SP-X software, export of data, analysis of data, applications.
<i>Duration</i>	8 h
<i>Theoretical program</i>	Presentation of the SP-X technology
<i>Practical program</i>	Preparation of the plate Incubation for 2 hours on Quanterix Simoa™ Microplate shaker Washing of the plate, incubation with Biotinylated Antibody Reagent (30 minutes), incubation with Streptavidin-HRP Reagent, reading of luminescence in the SP-X Imaging System Export data and analysis
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	Simoa HD-X
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	To do an assisted training with users' samples and to ensure that all points of the training have been retained.
<i>Number of Participants</i>	1-3 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Esma Karkeni
<i>Contact</i>	esma.karkeni@pasteur.fr

Training: Simoa HD-X

<i>Aim</i>	This course provides all information to use the HD-X. Covers the sample preparation, the use of the HD-X and data analysis.
<i>Summary</i>	Provide knowledge on Elisa technology and use of SIMOA, troubleshooting, software, export of data, analysis of data.
<i>Duration</i>	6 h
<i>Theoretical program</i>	Presentation of the SIMOA technology
<i>Practical program</i>	Preparation of the plate Maintenance on the SIMOA and step-up of the instrument Starting the run Shutdown of the instrument Analysis of data: Viewing results, edit standard curves, edit protocol, export data
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, SOP's
<i>Associated course</i>	SP-X
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform the basic maintenance procedures, to set-up, acquire and analyze an experiment and to export excel files.
<i>Number of Participants</i>	1-3 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Esma Karkeni
<i>Contact</i>	esma.karkeni@pasteur.fr

Training: Isolight

<i>Aim</i>	This course provides all information to use the SP-X. Covers the sample preparation, the use of the SP-X and the washer and data analysis.
<i>Summary</i>	Provide knowledge on use of Isolight, software, export and analysis of data.
<i>Duration</i>	6 h
<i>Theoretical program</i>	Presentation of the Isolight technology
<i>Practical program</i>	Sample preparation Cell staining Chip loading IsoSpeak data analysis
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform a chip loading and analyze data with the IsoSpeak software.
<i>Number of Participants</i>	1-3 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Esma Karkeni
<i>Contact</i>	esma.karkeni@pasteur.fr

Basic Training: Flow cytometry for beginners

<i>Aim</i>	This course provides a basic introduction to flow cytometry concepts and flow cytometers. It covers the fundamentals of flow cytometry to provide you with a solid base for future flow cytometry courses.
<i>Summary</i>	Introduction to principles of flow cytometry and cell sorting: basic principles of conventional flow cytometry.
<i>Duration</i>	4 h
<i>Practical program</i>	<ul style="list-style-type: none">• Theory (2h): all about fluidics, electronics & optics; compensations and settings, data's presentations• Practical session (2h): QC (Quality Control), settings, compensations; acquisitions, populations and gates strategy.
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, SOP's
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Course attendance.
<i>Number of Participants</i>	1-8 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sophie.novault@pasteur.fr

Training: Cytoflex analyser (BC)

<i>Aim</i>	Reviews basic principles of conventional flow cytometry, how it works, what it measures, together with workflows and operation of CytExpert cytometer software.
<i>Summary</i>	Provide basic knowledge on the use of Cytoflex and its software, required for autonomous use of the acquisition technology and data analysis.
<i>Duration</i>	3 h
<i>Practical program</i>	Presentation of fluidics, electronic & optics of Cytoflex Principle of acquisition: experiment set up, compensations setting, gating and statistic tools Maintenance procedures With sample or during a follow up session with user samples Experiment set up: acquisition, automatic compensations, gating, statistics, export of files
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training - basics of flow cytometry
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform the maintenance procedures, to create an experiment and compensations, to export fcs files.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	pierre-henri.commere@pasteur.fr , sebastien.megharba@pasteur.fr

Training: Fortessa / Symphony A5 (BD)

<i>Aim</i>	Reviews basic principles of conventional flow cytometry, how it works, what it measures, together with workflows and operation of «FACSDiva» flow cytometer software used by our BD Biosciences analyzers (Fortessa, and Symphony) operation and workflows are similar on all these instruments.
<i>Summary</i>	Provide basic knowledge on the use of Fortessa/Symphony and its software, required for autonomous use of the acquisition technology and data analysis. During the day, we will propose a tour of the instrumentation and all of its components, data acquisition and analysis, Instrument set up, instrument settings for data acquisition and storage. Multicolor experiment, data acquisition (hardware compensation and software compensation), and data analysis.
<i>Duration</i>	2 days, 7 h total
<i>Theoretical program</i>	Theoretical presentation of Fluidics, Electronics, Optics
<i>Practical program</i>	Theoretical presentation of Fluidics, Electronics, Optics of the Fortessa/Symphony Maintenance: Startup/ shutdown/ cleaning procedures Quality control and reports Diva software: acquisition, automatic compensations, gating and statistics Rules of multicolor experiment, Data export & QC
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, basics of cytometry
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform the maintenance procedures, to create an experiment and compensations, to export fcs files.
<i>Number of Participants</i>	1-6 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sophie.novault@pasteur.fr , sandrine.schmutz@pasteur.fr

Training: ID7000 Spectral Cytometry (Sony)

<i>Aim</i>	This course introduces spectral flow cytometry concepts and unmixing approaches, it covers the fundamentals of spectral cytometry to provide you with a solid base for future spectral cytometry and high dimensional phenotyping projects.
<i>Summary</i>	We will cover multicolor fluorescence and unmixing and we will provide an in-depth introduction to the instrument and the software. Delegates will have the opportunity to gain hands-on experience using ID7000 spectral analyzer, Spectral flow cytometry fundamentals will cover instrument operation, general maintenance, panel design and Sony software Overview. At the end of the training, we will have covered spectral experimental Workflow as well as spectral data analysis.
<i>Duration</i>	1 day, 5 h total
<i>Theoretical program</i>	Presentation of fluidic, electronic, optics components of the ID7000 Unmixing theory
<i>Practical program</i>	Quality control and maintenance procedures Experiment set up: acquisition, unmixing, gating, statistics, export of files
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, Basics of flow, Fortessa/Symphony
<i>Associated course</i>	Data analysis
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform the maintenance procedures (preparation of the instrument and validation of the quality control). Be able to create an experiment and unmixing, to export fcs files.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sandrine.schmutz@pasteur.fr , sophie.novault@pasteur.fr

Training: NanoCytometry (NanoFCM)

<i>Aim</i>	Reviews basic principles of nano cytometry, how it works, what it measures, together with workflows and operation of Nano FCM Flow cytometer software. You will learn how to measure size, quantify sub cellular particles from 40nm.
<i>Summary</i>	Provide basic knowledge on the use of the NanoFCM and its software, required for autonomous use of the acquisition technology and data analysis.
<i>Duration</i>	1 day, 3 h total
<i>Theoretical program</i>	Theoretical presentation of the technology
<i>Practical program</i>	Presentation of fluidic, electronic, optics components Quality control and maintenance procedures Experiment set up: calibration, acquisition, reports, export of files Experiment acquisition and samples analysis
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterium of validation</i>	Been able to perform the maintenance procedures, to visualize and quantify nanovesicles, to export files and reports.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sophie.novault@pasteur.fr , pierre-henri.commere@pasteur.fr

Training: Cell sorters ARIA III, Fusion, S6 (BD)

<i>Aim</i>	Covers cell sorting fundamentals to familiarize users with the workflow on electrostatic droplet sorters, such as the BD Biosciences Aria Flow Cytometer sorter models. BD Aria 3, Fusion, S6 have the same basic setup, operation, and workflow. Prior experience with BD flow cytometer analyzers, single cell analysis workflows, and FACSDiva software will ease the learning curve on the Arias.
<i>Summary</i>	Provide basic knowledge on the use of the FACS Aria III/ Fusion / S6 Sorters and the Diva Software, required for autonomous use of the sorting technology and data analysis.
<i>Duration</i>	2 days, 7 h total
<i>Theoretical program</i>	Theoretical presentation of Fluidics, Electronics, Optics Quality control and reports
<i>Practical program</i>	Theoretical presentation of fluidics, electronics and optics of the FACS Aria III sorter Diva, CST module Principle of sorting: stream/ side streams/ deflection and droplets formation Maintenance procedures Sort set up and experiment set up Diva software: acquisition, automatic compensations, gating and statistics Maintenance: Fluidic start up and shutdown procedures Sort and experiment set up, sort with beads and control of purity. <i>NB: for the FACS Aria Fusion, an additional session is proposed in front of the Aria Fusion</i>
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training Basics of cytometry/ Training Fortessa-A5 Symphony
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform the maintenance procedures (preparation of the instrument and validation of the quality control). Be able to create an experiment and unmixing, to export fcs files.
<i>Number of Participants</i>	1-6 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sandrine.schmutz@pasteur.fr , sebastien.megharba@pasteur.fr

Training: MultiMACS / AutoMACS

<i>Aim</i>	Provides basic knowledge and overview on the use of AutoMACS PRO for direct cell immuno magnetic cell separation.
<i>Summary</i>	Provides basic knowledge on the use of the AutoMACS; choose the best settings, daily maintenance procedures; replacement of columns; optimized purity and recovery.
<i>Duration</i>	1 h
<i>Period</i>	Running on demand, quarterly in French or in English
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Course attendance.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Miltenyi Biotech application specialist
<i>Contact</i>	sandrine.schmutz@pasteur.fr

Training: MARKII Imaging Cytometer (Cytek)

<i>Aim</i>	Reviews basic principles of imaging cytometry, how it works, what it measures, together with workflows and operation of Mark II imaging cytometer and its software INSPIRE, and spectral compensation and data analysis with IDEAS software.
<i>Summary</i>	Provide basic knowledge on use of MARKII, Inspire and Ideas software, required for autonomous use of the technology and data analysis.
<i>Duration</i>	2 days, 8 h total
<i>Theoretical program</i>	Presentation of functioning of the technology: optics, fluidics, electronics; How to set up experiment (selection of antibodies, controls, fluorochromes); Basic features of Ideas software (masks and features, principle of statistical analysis)
<i>Practical program</i>	Run experiment on the MARKII: Assist; cell classifier; different magnification; core diameters; single stained controls and samples; EDF; HTS; Troubleshooting. Analyse data using Ideas software: <ul style="list-style-type: none"> • Create Compensation Matrix; • Open experiment - set image properties – apply appropriate wizards • Create statistical report; • Batch process; • Export data.
<i>Period</i>	Running on demand
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	CB UTechS - New users training, SOPs
<i>Associated course</i>	Basics of flow cytometry
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform the basic maintenance procedures, to set-up and acquire an experiment and to export rcf files.
<i>Number of Participants</i>	1-4 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS
<i>Head of the course</i>	Laura Barrio Cano, Esma Karkeni
<i>Contact</i>	laura.barrio-cano@pasteur.fr , esma.karkeni@pasteur.fr

Advanced Training: Advanced Cytometry

<i>Aim</i>	Give participants the theoretical information needed to perform flow cytometric analyses independently: <ul style="list-style-type: none"> • Enable participants to develop experimental approaches, to develop data analysis strategies, and to use appropriate analytical softwares • Illustrate to participants the most common applications of flow cytometry with a special focus on applications in cell biology • Inform participants of the latest developments in the field of flow cytometry, of the technical progress and of multi-dimensional data analysis.
<i>Summary</i>	Overview of the most recent knowledge in panel design in regards with the instruments available for high dimensional analysis as well as existing tools for data analysis. The aim of this course is to provide an overview of the most recent knowledge in panel design in regards with the instruments available for high-dimensional analysis as well as existing tools for data analysis. This course is intended for people with solid basic knowledge in cytometry.
<i>Duration</i>	3 days, 10 h total
<i>Theoretical program</i>	Advanced Cytometry course allows the participants to acquire the necessary expertise in flow cytometry for the use of this technique in all applications for research purposes in cellular biology. The course is composed of three modules with theoretical lessons, Principle of panel design and high dimensional cytometry (part 1) High dimensional cytometry (part 2) and spectral cytometry FlowJo plugins (theory and practical examples) and OMIQ webinar
<i>Practical program</i>	1-Principles of panels design 2-High dimensional conventional & spectral cytometry 3-Unsupervised analysis
<i>Period</i>	Running on demand, once a year
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	Strong background in cytometry
<i>Associated course</i>	Basic training Flowjo
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Been able to perform the basic maintenance procedures, to set-up and acquire an experiment and to export rcf files.
<i>Number of Participants</i>	1-8 places
<i>Registration</i>	https://webcampus.pasteur.fr/jcms/wcp_1052449/fr/cytometry-courses
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sophie.novault@pasteur.fr , sandrine.schmutz@pasteur.fr

Training: Flowjo analysis software (BD)	
<i>Aim</i>	Provides basic knowledge and overview on the use of FlowJo software.
<i>Summary</i>	FlowJo™ is the leading analysis platform for cytometry data flow analysis. Take your data to the next level with the latest tools in FlowJo.
<i>Duration</i>	5 h
<i>Theoretical program</i>	Introduction to FlowJov10 (workspace, compensation, tools)
<i>Practical program</i>	Flow cytometry, multicolor flow and compensation: general principles General layout introduction; Workspace overview Creating, handling and saving workspaces; Creation of groups;Gating procedures Creating statistics tables with the Table editor Data visualization with Layout editor; Batch analysis features Automated compensation; Practical exercise with some datasets
<i>Period</i>	Running on demand, quarterly in French or in English
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	Background in cytometry Tutorials online: https://www.flowjo.com/learn/flowjo-university/flowjo
<i>Associated course</i>	Cytometer training
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Course attendance
<i>Number of Participants</i>	1-12 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS or https://webcampus.pasteur.fr/jcms/wcp_1052449/fr/cytometry-courses
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sandrine.schmutz@pasteur.fr

Advanced training: Unsupervised Analysis	
<i>Aim</i>	Unsupervised Analysis of Flow Cytometry Data in Cell Diversity and Allows Population Discovery. Data obtained with cytometry are increasingly complex and their interrogation impacts the type and quality of knowledge gained.
<i>Summary</i>	Provide overview of the existing solutions for unsupervised data analysis, learn about plugins, how to install and to use them, application with a concrete example. Foundations of multidimensional data analysis: Dimensionality reduction and clustering: pitfalls Exploring high-dimensional data in FlowJo, OMIQ & others analysis solutions.
<i>Duration</i>	5 h
<i>Theoretical program</i>	Introduction to plugins, installation of required tools, Exploring high-dimensional data in FlowJO plugins, OMIQ, Cytobank... and others Foundations of multidimensional data analysis. Practical training from pre-processing to visualization. Data QC, Clean up data, Scaling, Dimensionality reduction and clustering: pitfalls and practicalities.
<i>Practical program</i>	Practical application
<i>Period</i>	Running on demand, Once a year
<i>Language</i>	French / English depending on the request
<i>Pre-Requirement</i>	FlowJo Basics, tutorials online https://www.flowjo.com/learn/flowjo-university/flowjo
<i>Associated course</i>	Cytometer training
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	
<i>Number of Participants</i>	1-12 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS or https://webcampus.pasteur.fr/jcms/wcp_1052449/fr/cytometry-courses
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sandrine.schmutz@pasteur.fr

Training: Schnapps	
<i>Aim</i>	Enable the user to work with single cell RNAseq without using a programming language like R or Python.
<i>Summary</i>	Overview of the graphical user interface dedicated to data analysis of single cell RNAseq data, called SCHNAPPS. The training explains how to load data, perform quality control and preprocessing steps, and analyze the data using dimension reduction, clustering, and differential gene expression analysis.
<i>Duration</i>	2 h
<i>Program</i>	Description of main functionalities and where to find further help
<i>Period</i>	Running on demand (proposed at least with 1x/month frequency)
<i>Language</i>	English
<i>Pre-Requirement</i>	None
<i>Associated course</i>	10xGenomics, MARS-Seq, library preparation
<i>Site of the training</i>	UTechS CB, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Course attendance.
<i>Number of Participants</i>	1-3 places
<i>Registration</i>	https://ppms.eu/pasteur/?CB_UTechS or https://webcampus.pasteur.fr/jcms/wcp_1052449/fr/cytometry-courses
<i>Head of the course</i>	Bernd Jagla
<i>Contact</i>	bernd.jagla@pasteur.fr

Annual course: Fundamentals of Flow Cytometry	
<i>Aim</i>	5-day courses will serve as an introduction to the use of flow cytometry to less experienced delegates or those wanting to expand their knowledge. On each course, we will cover the basics of fluorescence and the flow cytometer and demonstrate some of the more commonly used applications to illustrate how the cytometer can be used.
<i>Summary</i>	This 5-day program is ideal for those who are looking for an in-depth, hands-on introduction to Flow Cytometry. We will cover multicolor fluorescence and compensation, Conventional & Spectral cytometry as well as high-speed sorting. Delegates will have the opportunity to gain hands-on experience using either a BD Symphony A5, an LSR Fortessa or CytoFlex and data generated will also be used to help illustrate how best to perform data analysis (FlowJo, OMIQ software's). Places will be limited to 12 delegates to ensure maximum interaction.
<i>Duration</i>	1 week, 5 days
<i>Theoretical program</i>	Power-point presentation on flow cytometry principles, methods and applications followed by questions by the participants Basic Analytical Techniques, Principles, and Trouble Shooting; Principles of Cell Staining Hands on session at the flow cytometry platform UTechS Choosing the Right Experimental Controls, Instrument Setup (baseline and compensation) Preparation of Samples for Multicolor Analysis Flow Sorting; Multicolor Analysis, Compensation and Flow Sorting; Hands-on Flow Cytometry Exercises Using BD Symphony A5, BD Fortessa, Beckman Coulter Cytoflex S, ID7000 Spectral analyzer, Astrios Beckman Coulter, BD FACS Aria III and Software training: Introduction to FlowJo Analysis Software; Introduction to OMIQ software
<i>Practical program</i>	Our instructors will focus on a broad spectrum of flow cytometric topics, discuss examples from various research applications, provide technical protocols for flow cytometric sample preparation, as well as data analysis, troubleshooting and experimental design. Attendees will have hands-on experience on four different flow platforms (Becton Dickinson, Beckman Coulter and Sony) as well as exposure to flowjo software analysis program
<i>Period</i>	Once a year (in June)
<i>Language</i>	French
<i>Pre-Requirement</i>	None
<i>Associated course</i>	None
<i>Site of the training</i>	UTechS MSBio, 1 st floor building François Jacob
<i>Eligible participants</i>	Doctorants, techniciens, ingénieurs, chercheurs
<i>Criterion of validation</i>	Course attendance
<i>Number of Participants</i>	1-12 places
<i>Registration</i>	https://webcampus.pasteur.fr/jcms/wcp_1052449/fr/cytometry-courses
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sophie.novault@pasteur.fr ; caroline.boursaux-eude@pasteur.fr

Annual course: Single-cell gene expression and beyond

<i>Aim</i>	The course aims at providing theoretical and hands-on training for all steps of high-throughput single cell profiling, from single-cell sample and library preparation to data analysis, using state-of-the-art technological solutions.
<i>Summary</i>	This 5-days course covers cutting-edge technologies for single-cell omics, microfluidics and the state-of-the-art solutions for single-cell RNA transcriptomic data analysis. The course includes a theoretical part with technology seminars and 2 talks of invited speakers; a practical part with hands-on sessions: single-cell RNA-Seq with 10x Genomics Chromium controller (from cell encapsulation to library preparation); use of microfluidics for cell capture, imaging and single-cell sorting; data analysis. The symposium is intended for scientists, students and Core Facility staff interested in applying advanced single-cell transcriptome sequencing in their research.
<i>Duration</i>	5 days (40 hours)
<i>Theoretical program</i>	Introduction to single cell analysis Strategies for measuring single cell gene expression Cell sorting for single cell profiling Introduction to library preparation for MARS-seq Principles and challenges of mRNA sequencing Developing single-cell methods in stationary microfluidic droplets Introduction to single cell mRNA-seq data analysis: challenges and tools Computational identification and characterization of rare cells from scRNA-seq
<i>Practical program</i>	The hands-on sessions will take place at the Education Center of Institut Pasteur and in the CB UTechS laboratories and will include: separation of single cells by FACS (0.5 day); Single cell RNA prep by droplet-based assays (10xGenomics) (0.5 day); Preparation and quantification of single cell RNA-Seq libraries (1 day); Introduction to microfluidics-based approaches for single cell profiling (0.5 day); Basics of single cell transcriptome data analysis using state-of-the-art data analysis pipelines (2 days). Quality Controls, best practices and “tips and tricks” will be discussed
<i>Period</i>	2 nd Term
<i>Language</i>	English
<i>Pre-Requirement</i>	Basic knowledge of molecular biology and basics in “R” are desirable
<i>Associated course</i>	Biomics training path
<i>Site of the training</i>	CB UTechS; Education building
<i>Eligible participants</i>	Research engineer, post doc, PhD student
<i>Criterion of validation</i>	Course attendance
<i>Number of Participants</i>	12 places
<i>Registration</i>	https://webcampus.pasteur.fr/jcms/c_780503/fr/single-cell-gene-expression-and-beyond
<i>Head of the course</i>	Sophie Novault
<i>Contact</i>	sophie.novault@pasteur.fr ; caroline.boursaux-eude@pasteur.fr

MULTISCALE IMAGING

Photonic Biolmaging training path

From image to function

Introduction

Photonic Biolmaging is a Unit of Technology and Service (UTechS) providing optical imaging expertise in life sciences and especially their application in studies on infectious biology.

Our activities include service rendering, training, technology-driven research and technology development. Our trainings catalogue includes basic courses and trainings (basic to advanced) to formalize autonomous access to our technologies.

Basic course

Optical imaging

Description: In this module, we propose to discuss general concepts in microscopy and fundamental optical principles as well as more specific topics and advanced applications that you will be able to access in dedicated sessions. We will additionally address basic statistical concepts for the extraction of relevant experimental imaging results.

Length: 1.5 h

Advanced courses

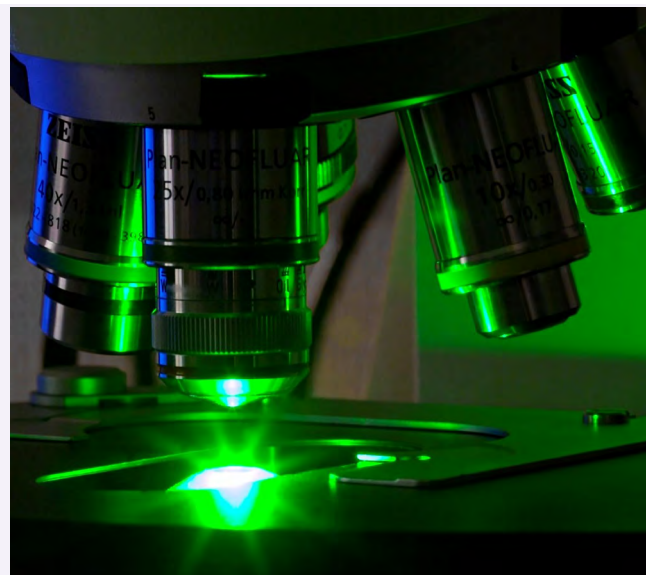
Widefield microscopy

Description: Epifluorescence and transmission imaging are the simplest tools in microscopy. In this course/training module, we propose to discuss general concepts of microscopy and fundamental optical principle, from sample preparation to acquisition. At the end of this module, trainees will be granted autonomous access to our widefield microscopes.

Length: 2 h theory + 2 h practice (4 h total)

Multiphoton microscopy

Description: This module aims to cover the basic concepts behind multiphoton microscopy, its advantages and drawbacks compared to other fluorescence imaging techniques and its relevance to live sample imaging as well as deep tissues imaging.



We will also address practical sample consideration and instrument settings to optimize acquisition of proposed samples.

Length: 1 h theory + 3 h practice (4 h total)

Laser scanning microscopy

Description: This hands-on course will cover all the basic knowledge and practice associated with laser scanning microscopy, from the specifications of the microscope to its common uses, and its limitations. The module is divided into 2 hands on sessions, the latter with the trainee specific sample. A specific application to separate fluorophores and remove autofluorescence could be presented: spectral imaging. More specifics trainings on more advanced confocal-based techniques (FLIM...) can be accessed upon request on the molecular motion and interaction course.

Length: 2 h theory + 2 h practice (4 h total)

Spinning Disk

Description: This module will cover all the basic concept of the spinning disk imaging and the extent of samples that can be imaged (live sample and fixed sample). The module is divided into 2 hands-on sessions: the first session will concern the handling of the microscope and its dedicated software,

the latter with the trainee specific sample. More specifics trainings in more advanced techniques (FRAP...) can be accessed upon request on the molecular motion and interaction course.

Length: 2 h theory + 2 h practice (4 h total)

Super resolution microscopy: Structured illumination

Description: In this course we will focus on Structured Illumination Microscopy (SIM). After reviewing its principles, we will discuss its advantages and disadvantages and applications related to live imaging. We will also address some practical considerations on the type of sample we can image and sample preparation. Part of this training will be dedicated to dealing with artefacts in cellular imaging and more particularly in SIM.

Length: 2 h theory + 2 h practice (4 h total)

Super resolution microscopy: Single molecule localisation

Description: In this course we will focus on Single Molecule Localization Microscopy (SMLM). After reviewing its principles, we will discuss its advantages and disadvantages and characteristics of the associated techniques: PALM, dSTORM, PAINT. We will discuss super resolved imaging in 2D but also 3D with the different existing methods to increase the axial resolution. During this course, we will discuss the workflow from sample preparation to image reconstruction to highlight the influence of each step in the final image and the importance of adapting the protocol according to the sample.

Length: 2 h theory + 4 h practice (6 h total)

High content analysis

Description: This course will introduce the concept behind automated imaging for high content analysis. We will give an overview of the considerations to keep in mind during the experimental design, the imaging, the analysis, and the statistical validation of results extracted from images.

Length: 6 h

Lightsheet microscopy

Description: This course will introduce the concept behind Light sheet microscopy, its strengths, and limitations when it comes to image various sample types. We will

highlight two system geometries and sample preparation consideration relevant to those systems.

Length: 2 h theory + 2 h practice (4 h total)

Small animal imaging

Description: This course will introduce the concept behind small animal imaging, its strengths and limitations according to the sample types, the fluorescent probes or the bioluminescent enzymes used but also the basic rules in A3 environment for live animals' manipulation and the handling of living image software and imaging device. We will highlight how to optimize your acquisitions according to your problematics for quantitative analysis.

Length: 2.5 h theory + 2.5 h practice (4 h total)

Molecular motion and interaction

Description: This advanced course will cover the microscopy techniques for quantifying the movement of molecules and their interactions with their environment in living cells: FCS/FRAP/FLIM/FRET. These techniques are based on different imaging systems and require dedicated acquisition, optical elements, and analysis tools.

Length: 2 h theory + 3 h practice (5 h total)

Live cell recorder

Description: This formation will introduce the concept behind structural microscopy, its strengths and limitations.

Length: 2.5 h theory + 2 h practice (4.5 h total)

Basic course:

Optical imaging - From basic concepts to advanced techniques

“Souvenez-vous que dans les champs de l’observation le hasard ne favorise que les esprits préparés.” (Louis Pasteur, Université de Lille, 1854).
 “Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris, 2018)

Aim	The course aims to provide basic knowledge/update on general concepts in microscopy, sample preparation and its applications.
Summary	In this module, we propose to discuss general concepts in microscopy and fundamental optical principles as well as more specific topics and advanced applications that you will be able to access in dedicated sessions. We will additionally address basic statistical concepts for the extraction of relevant experimental imaging results.
Duration	1.5 h
Theoretical program	<ul style="list-style-type: none"> • Basic Concepts • Sample considerations • Advanced Technologies (brief overview) • Sample preparation • Facility access policies • Anatomy of microscope • From Sample Images to Statistics • Principles • Pros and Cons
Practical program	NA
Period	Every other Monday 2PM
Language	French / English, depending on the request
Pre-Requirement	None
Associated course	All the advanced courses
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Class attendance
Number of Participants	At least 3 attendees per session
Registration	PPMS booking system (more information on our website)
Head of the course	Head pedagogic: Spencer Shorte/Nathalie Aulner Trainers: PBI Staff
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Widefield microscopy

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to provide solid knowledge of fluorescent imaging.
Summary	Epifluorescence and transmission imaging are the simplest tools in microscopy. In this course/training module, we propose to discuss general concepts of microscopy and fundamental optical principle, from sample preparation to acquisition. At the end of this module, trainees will be granted autonomous access to our widefield microscopes.
Duration	2 h theory + 2 h practice (4 h total)
Theoretical program	Presentation of a widefield microscope: principle Reminder: contrast and principle of fluorescence Technical considerations: when to use epifluorescence and what to set up Presentation of a widefield microscope: how to use it Acquiring an image: brightfield, contrast, and fluorescence Photobleaching illustrated
Practical program	Applying the concepts to the trainee’s own samples Specific guidelines
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Basic course Optical imaging
Associated course	Basic course Optical imaging
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	1-2 participant
Registration	PPMS booking system (more information on our website)
Head of the course	Lesly Raulin
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Multiphoton microscopy

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to provide basic knowledge in multiphoton microscopy.
Summary	This module aims to cover the basic concepts behind multiphoton microscopy, its advantages and drawbacks compared to other fluorescence imaging techniques and its relevance to live sample imaging as well as deep tissues imaging. We will also address practical sample consideration and instrument settings to optimize acquisition of proposed samples.
Duration	1 h theory + 3 h practice (4 h total)
Theoretical program	Introduction to the basic physical effect behind multiphoton microscopy Second harmonic generation Key hardware components of a two-photon microscope Biological sample consideration Resolution and instrument set up emphasis for optimal acquisition Image reconstruction (Extra: Photostimulation what more can you do with such a system)
Practical program	Instrument characterization. Depth imaging strategies Second harmonic generation on collagen Image reconstruction
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course “Optical imaging” or proof of experience
Associated course	Basic course Optical imaging
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	1-2 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Julien Fernandes, Elric Esposito
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Laser scanning microscopy

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to provide basic knowledge in confocal microscopy.
Summary	This hands-on course will cover all the basic knowledge and practice associated with laser scanning microscopy, from the specifications of the microscope to its common uses, and its limitations. The module is divided into 2 hands on sessions, the latter with the trainee specific sample. A specific application to separate fluorophores and remove autofluorescence could be presented: spectral imaging. More specifics trainings on more advanced confocal-based techniques (FLIM...) can be accessed upon request on the molecular motion and interaction course.
Duration	2 h theory + 2 h practice (4 h total)
Theoretical program	Introduction to basic knowledge in point laser scanning microscopy PMT/Gaasp detector Pixel size/resolution Histogram
Practical program	Software handling Imaging of a commercial sample Advances techniques in laser scanning microscope (spectral scanning...)
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the basic course “Optical imaging”
Associated courses	Advanced course “Widefield Microscopy”; “Molecular motion and interaction”
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation / QCM
Number of Participants	6-8 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Audrey Salles and Julien Fernandes
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Spinning disk

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to provide basic knowledge in spinning disk microscopy.
Summary	This module will cover all the basic concept of the spinning disk imaging and the extent of samples that can be imaged (live sample and fixed sample). The module is divided into 2 hands-on sessions: the first session will concern the handling of the microscope and its dedicated software, the latter with the trainee specific sample. More specifics trainings in more advanced techniques (FRAP..) can be accessed upon request on the molecular motion and interaction course.
Duration	2 h theory + 2 h practice (4 h total)
Theoretical program	Introduction to the basic concept of spinning disk imaging Comparison between laser-scanning and spinning disk confocal microscopy Detectors: cameras/pixel size Presentation of the microscope Presentation and demonstration of the acquisition software Image optimization and overview of acquisition parameters with a fixed sample
Practical program	Handling of the microscope and its associated software by the user Acquisition on a sample of interest for the user (optimization of acquisition parameters)
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course “Optical imaging”
Associated courses	Advanced courses “Widefield Microscopy”, “Laser Scanning”
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	1-2 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Lesly Raulin, Christelle Travaillé
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course:
Super resolution microscopy - Structured Illumination Microscopy

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to provide basic knowledge in Structured Illumination Microscopy (SIM).
Summary	In this course we will focus on Structured Illumination Microscopy (SIM). After reviewing its principles, we will discuss its advantages and disadvantages and applications related to live imaging. We will also address some practical considerations on the type of sample we can image and sample preparation. Part of this training will be dedicated to dealing with artefacts in cellular imaging and more particularly in SIM.
Duration	2 h theory + 4 h practice (6 h total)
Theoretical program	Introduction to super resolution microscopy Principle of Structured Illumination Microscopy The Fourier transform and its use in SIM Acquisition and processing Sample preparation Artefacts Applications
Practical program	Instrument characterization Acquisition and processing on fixed and bright fluorescent sample (2 h) Artefacts in SIM and acquisition with low fluorescent signal Structured illumination on live sample (2 h)
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course “Optical Imaging”, and Advanced course “Widefield Microscopy”
Associated course	Advanced course: “Widefield Microscopy”
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	2 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Audrey Salles
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Super resolution microscopy

Single Molecule Localisation Microscopy

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to provide basic knowledge in Single Molecule Localization Microscopy (SMLM). After reviewing its principles, we will discuss its advantages and disadvantages and characteristics of the associated techniques: PALM, dSTORM, PAINT.
Summary	In this course we will focus on Single Molecule Localization Microscopy (SMLM). After reviewing its principles, we will discuss its advantages and disadvantages and characteristics of the associated techniques: PALM, dSTORM, PAINT. We will discuss super resolved imaging in 2D but also 3D with the different existing methods to increase the axial resolution. During this course, we will discuss the workflow from sample preparation to image reconstruction to highlight the influence of each step in the final image and the importance of adapting the protocol according to the sample.
Duration	2 h theory + 4 h practice (6 h total)
Theoretical program	Introduction to super resolution microscopy Principle of Single Molecule Localization Microscopy The different types of techniques associated with SMLM: PALM/ dSTORM/PAINT Acquisition and processing Sample preparation Artefacts Applications
Practical program	Instrument characterization Sample preparation STORM Acquisition and processing for STORM imaging Discussion
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course “Optical Imaging”, and Advanced course “Widefield Microscopy”
Associated courses	“Widefield Microscopy”, “Structured illumination microscopy”
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	1-2 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Audrey Salles
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: High Content analysis

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to provide conceptual and hands on experience in high content imaging.
Summary	This course will introduce the concept behind automated imaging for high content analysis. We will give an overview of the considerations to keep in mind during the experimental design, the imaging, the analysis, and the statistical validation of results extracted from images.
Duration	6 h in total for practical on instrument and image/data analysis
Theoretical program	Introduction of High Content Analysis (HCA) and its applications Sample preparation consideration Basic concepts to perform a high content analysis Automated Image analysis basic concept Result analysis (introduction to basic concept in statistics related to HCA)
Practical program	Plate acquisition on OPERA Phenix microscope Automated Image analysis on the plate Data analysis and validation
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course “Optical Imaging”, basic knowledge in image analysis P2+ access (via GAIP) SPR validation for pathogen manipulation
Associated courses	Advanced courses: “Widefield Microscopy” and “Spinning disk microscopy
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Regular class attendance and expert evaluation
Number of Participants	1-2 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Nathalie Aulner, Anne Danckaert
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Lightsheet Microscopy

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of this course is to provide general concepts and hands-on experience on light sheet microscopy.
Summary	This course will introduce the concept behind Light sheet microscopy, its strengths, and limitations when it comes to image various sample types. We will highlight two system geometries and sample preparation consideration relevant to those systems.
Duration	2 h theory + 2 h practice (4 h total)
Theoretical program	Basics behind lightsheet microscopy General optical concept Various systems architecture and applications Optical techniques used for enhanced imaging Sample preparation Mounting Sample preparation: Clearing Image reconstruction and visualization
Practical program	Sample preparation and mounting Acquisition on Lavision Ultraview microscope Acquisition on Dual inverted Single Plane imaging microscope (DiSPIM)
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course “optical Imaging”
Associated courses	None
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	1-2 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Julien Fernandes, Elric Esposito
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Small animal imaging

“Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible.” (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of this course is to provide general concepts and hands on experience of small animal imaging.
Summary	This course will introduce the concept behind small animal imaging, its strengths and limitations according to the sample types, the fluorescent probes or the bioluminescent enzymes used but also the basic rules in A3 environment for live animals’ manipulation and the handling of living image software and imaging device. We will highlight how to optimize your acquisitions according to your problematics for quantitative analysis.
Duration	2.5 h theory, 2 h practice (4.5 h total)
Theoretical program	Basics of optical molecular small animal imaging and its interest in research IVIS spectrum and spectrum CT device presentation General rules for animal manipulation and welfare (3R) in A3 environment Isoflurane gas anesthesia basics Recommendations for animal installation in imaging systems
Practical program	Assisted session with animal manipulation and installation in the different imaging systems Isoflurane gas anesthesia manipulation Use of Living Image software for image acquisition and analysis
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course optical Imaging Good knowledge about living animal manipulation and welfare BIME A3 access and authorization for live animal imaging procedures validated by the animal facility (via GAIP)
Associated courses	Isoflurane gas anesthesia system in practice (contact: myriam.mattei@pasteur.fr) BIME A3 manipulation in ventilated cages or isolators (contact: sec-anim@pasteur.fr)
Site of the training	BIME A3, -2 nd Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	1-4 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Christelle Travaillé, Julien Fernandes
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Molecular motion and interaction

"Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible." (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of the course is to present all the advanced microscopy techniques which, beyond the generation of an image, allow the extraction of quantitative information on the movement and interactions of biomolecules.
Summary	This advanced course will cover the microscopy techniques for quantifying the movement of molecules and their interactions with their environment in living cells: FCS/FRAP/FLIM/FRET. These techniques are based on different imaging systems and require dedicated acquisition, optical elements, and analysis tools.
Duration	2 h theory + 3 h practice (5 h total)
Theoretical program	B Introduction to the advanced F- microscopy techniques: FCS/ FRET/FRAP/FLIM
Practical program	FCS/ FRAP FRET/FLIM
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course "Optical Imaging" and the Advanced course: "Widefield Microscopy", "Laser scanning microscopy" and "Spinning disk microscopy"
Associated courses	Advanced course: "Widefield Microscopy", "Laser scanning microscopy" and "Spinning disk" microscopy
Site of the training	UTechS PBI, 1 st and 3 rd Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation / QCM
Number of Participants	8 participants
Registration	to be defined
Head of the course	Audrey Salles, Julien Fernandes, Elric Esposito
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Advanced course: Live cell recorder

"Knowledge is a collection of elegant metaphors; we need sophisticated images to make this visible." (Eric Orsenna, Institut Pasteur, Paris 2018)

Aim	The aim of this course is to provide general concepts and hands on experience of structural microscopy.
Summary	This formation will introduce the concept behind structural microscopy, its strengths and limitations.
Duration	2.5 h theory, 2 h practice (4.5 h total)
Theoretical program	Principle of structural microscopy Presentation of the system and the environmental controller General rules in BSL2 environment and accessibility Recommendations for sample preparation Presentation of the acquisition software, image exportation and basic analysis with a fixed sample
Practical program	Use of Eve software for image acquisition by the user on a live sample of interest
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the Basic course "Optical Imaging" P2+ access (via GAIP) SPR validation for pathogen manipulation
Associated courses	Basic course "Optical Imaging"
Site of the training	UTechS PBI, 1 st Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers, undergraduates
Criterium of validation	Attendance and expert evaluation
Number of Participants	1-2 participants
Registration	PPMS booking system (more information on our website)
Head of the course	Christelle Travaillé, Julien Fernandes
Contact	PBI.contact@pasteur.fr
Code formation Talent soft	PB3345

Ultrastructural Biolmaging training path

Seeing is believing

Introduction

We provide scientific and technical support in Scanning and Transmission Electron Microscopy. We routinely perform a wide range of sample preparations and imaging techniques at room temperature, in cryo or in 3D. We also develop new sample preparations and imaging pipelines. The main objective of the courses is to give to the participants basic knowledge on electron microscopy concepts as well as advanced more targeted trainings.

Basic course

Ultrastructural Biolmaging: from basic concepts to advanced techniques

Description: In this module, we propose to discuss general concepts in microscopy as well as more specific topics and advanced applications: cryo-methods, 3D approaches, Correlative microscopy and data analyses.

Length: 1 day theory

Advanced courses

Scanning electron microscopy

Description: Scanning electron microscopy methods are essential to study surface cells morphology and immunolabelling. In this course module, we propose to discuss general concepts of scanning electron microscopy from sample preparation to acquisition.

Length: 1 h theory + 5 h practice (6 h total)

Transmission Electron Microscopy (conventionnal)

Description: This module aims to cover the basic concepts behind transmission electron microscopy: negative staining imaging on single particles and imaging on sample sections. We will also address practical sample consideration and instrument settings to optimize acquisition.

Length: 4 days, 2 h theory, 32 h practice (34 h total)

Transmission electron microscopy (cryo-methods)

Description: This advanced course will cover all the basic knowledge on high pressure freezing and freeze substitution for ultrastructure and/or immunolabelling.

Length: 2 days: 2 h theory, 8 h practice (9 h total)

Focused ion beam- scanning electron microscopy

Description: In this course we will focus on sample preparation and FIB-SEM acquisition.

After reviewing the FIB-SEM principle, we will show example of application and we will discuss its advantages and disadvantages as well as the possible applications related with a focus on correlative microscopy.

Length: 2 h theory

Cryo-microtomy and immunolocalisation

Description: In this course we will focus on the Tokuyasu method.

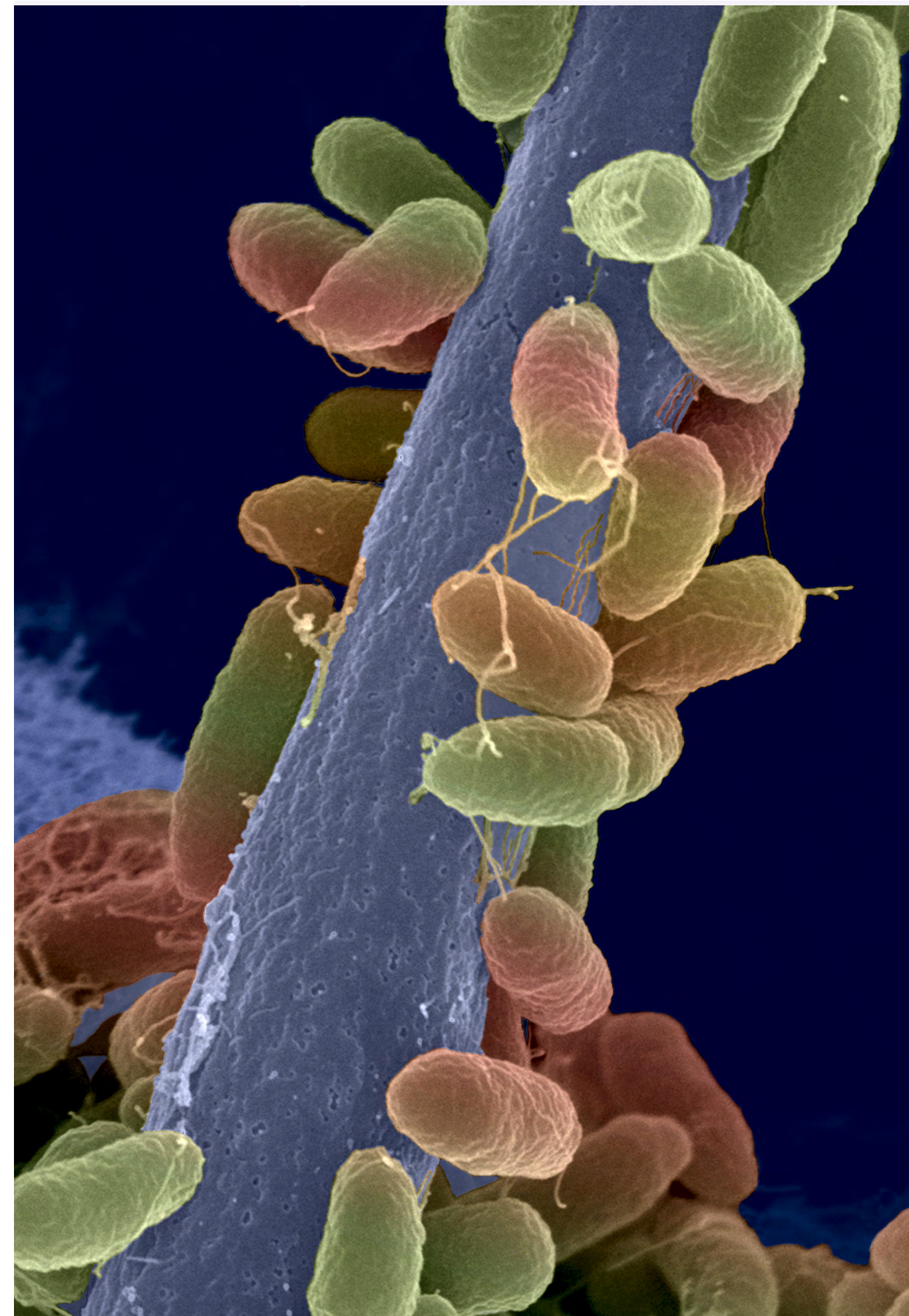
After reviewing its principles, we will discuss its advantages and limits.

Length: 3 days: 2 h theory, 12 h practice (14 h total)

Correlative methods (CLEM)

Description: This advanced course will cover all the aspect of CLEM approaches.

Length: 2 h theory



Basic course:

Ultrastructural Biolmaging: from basic concepts to advanced techniques

Aim	The aim of the course is to provide basic knowledge/update on general concepts in microscopy, sample preparations and its applications.
Summary	In this module, we propose to discuss general concepts in microscopy as well as more specific topics and advanced applications.
Duration	1 day theory
Theoretical program	The program will target the following topics: Anatomy of microscopes (SEM / TEM) Biological sample preparations Imaging 3D methods Cryo-sample preparation Data analyses Exemple of applications
Practical program	Visit of the core facility
Period	Twice a year
Language	French / English, depending on the request
Pre-Requirement	None
Associated courses	None
Site of the training	UBI core facility, ground Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Regulart class attendance and expert evaluation / QCM
Number of Participants	30 participants
Registration	webcampus.pasteur.fr/ip/formations-campus
Head of the course	Adeline Mallet
Contact	adeline.mallet@pasteur.fr

Advanced course: Scanning electron microscopy

Aim	The aim of the course is to provide fundamental knowledge of scanning electron imaging on biological samplesy.
Summary	Scanning electron microscopy methods are essential to study surface cells morphology and immunolabelling. In this course module, we propose to discuss general concepts of scanning electron microscopy from sample preparation to acquisition.
Duration	1 day: 1 h theory, 5 h practice (6 h total)
Theoretical program	Presentation of a scanning electron microscope: principle Sample preparation Technical considerations: detectors, observation parameters
Practical program	Fixation and sample preparation Acquiring images
Period	10 times / year
Language	French / English, depending on the request
Pre-Requirement	None
Associated courses	None
Site of the training	UBI core facility, ground Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Regulart class attendance and expert evaluation / QCM
Number of Participants	2 participants
Registration	https://ppms.eu/pasteur/login/?pf=5
Head of the course	Adeline Mallet
Contact	ubi.all@pasteur.fr

Advanced course: Transmission Electron Microscopy (conventionnal)

Aim	The aim of the course is to provide basic knowledge in transmission electron microscopy.
Summary	This module aims to cover the basic concepts behind transmission electron microscopy: negative staining imaging on single particles and imaging on sample sections. We will also address practical sample consideration and instrument settings to optimize acquisition.
Duration	4 days: 2 h theory, 32 h practice (34 h total)
Theoretical program	Introduction to the transmission electron microscopy Biological Sample consideration Methods Resolution and Instrument set up emphasis for optimal acquisition Imaging
Practical program	Sample preparation (negative staining / fixation to embedding) Sectioning (initiation) Transmission electron microscopy observation
Period	Once a year
Language	French / English, depending on the request
Pre-Requirement	Validation of the “basic concept in microscopy module” or proof of experience
Associated courses	None
Site of the training	UBI core facility, ground Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Regular class attendance and expert evaluation / QCM
Number of Participants	2 participants
Registration	https://ppms.eu/pasteur/login/?pf=5
Head of the course	Adeline Mallet
Contact	ubi.all@pasteur.fr

Advanced course: Transmission electron microscopy (cryo-methods)

Aim	The aim of the course is to provide theoretical concept on advanced transmission electron microscopy methods (Cryo-methods).
Summary	This advanced course will cover all the basic knowledge on high pressure freezing and freeze substitution for ultrastructure and/or immunolabelling.
Duration	1 day: 2 h theory
Theoretical program	Overview of cryo-methods Cryo-fixation Cryo- substitution Examples on project applications
Practical program	None
Period	Once a year
Language	French / English, depending on the request
Pre-Requirement	Validation of the “transmission electron microscopy (conventional) module”
Associated courses	None
Site of the training	UBI core facility, ground Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Regular class attendance and expert evaluation / QCM
Number of Participants	2 participants
Registration	https://ppms.eu/pasteur/login/?pf=5
Head of the course	Adeline Mallet
Contact	ubi.all@pasteur.fr

Advanced course: Electron tomography

Aim	The aim of the course is to provide basic knowledge and practical skills in acquisition of Tilt Series for single or dual-axis tomography.
Summary	This module will cover all the basic concepts of electron tomography.
Duration	1 day: 2 h theory
Theoretical program	Introduction to electron tomography. Strategies of data collection
Practical program	Tilt series acquisition
Period	Running on demand
Language	English
Pre-Requirement	TEM basics, Basic SerialEM functions or familiarity with other software for automated acquisitions
Associated courses	TEM (conventional) & TEM advanced methods
Site of the training	Theoretical part: CFJ room; Practical part: F20 room
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Participation
Number of Participants	2 participants
Registration	https://ppms.eu/pasteur/login/?pf=5
Head of the course	Adeline Mallet
Contact	ubi.all@pasteur.fr

Advanced course: Focused ion beam-scanning electron microscopy

Aim	The aim of the course is to provide basic knowledge in FIB-SEM (slice and view on block surface).
Summary	In this course we will focus on FIB-SEM acquisition. After reviewing the FIB-SEM principle, we will show examples of applications and we will discuss its advantages and disadvantages as well as the possible applications related with a focus on correlative microscopy.
Duration	1 day: 2 h theory
Theoretical program	Introduction to FIB-SEM Principle Sample preparation Acquisition and processing reconstruction
Practical program	None
Period	Twice a year
Language	French / English, depending on the request
Pre-Requirement	Validation of the “basic concepts”
Associated courses	“Epifluorescence” module
Site of the training	Building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Regulart class attendance and expert evaluation
Number of Participants	10 participants
Registration	https://ppms.eu/pasteur/login/?pf=5
Head of the course	Adeline Mallet
Contact	ubi.all@pasteur.fr

Advanced course:

Cryo-microtomy and immunolocalisation (Tokuyasu method)

Aim	The aim of the course is to provide basic knowledge in cryo-microtomy and immunolabelling.
Summary	In this course we will focus on the Tokuyasu method. After reviewing its principles, we will discuss its advantages and limits
Duration	3 days: 2 h theory, 12 h practice (14 h total)
Theoretical program	Introduction to the Tokuyasu method Principle of cryo-microtomy Immunolabeling on sections (basic consepts) Acquisition Artefacts Applications
Practical program	Instrument. Sample preparation Cryomicrotomy Immunolabelling Acquisition on transmission electron microscopy Discussion
Period	Twice a year
Language	French / English, depending on the request
Pre-Requirement	Validation of the “Basic concept” + “TEM (conventional)
Associated courses	None
Site of the training	Theoretical part: CFJ room; Practical part: F20 room
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Regular class attendance and expert evaluation
Number of Participants	3 participants
Registration	https://ppms.eu/pasteur/login/?pf=5
Head of the course	Adeline Mallet
Contact	ubi.all@pasteur.fr

Advance course: Correlative methods (CLEM)

Aim	The aim of the course is to provide bases on correlative methods (CLEM).
Summary	This advanced course will cover all the aspect of CLEM approaches.
Duration	1 day: 2 h theory
Theoretical program	Introduction to FIB-SEM Principle Sample preparation Acquisition and processing reconstruction
Practical program	None
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Validation of the “basic concepts”
Associated courses	None
Site of the training	UBI core facility, ground Floor building François Jacob
Eligible participants	PhD, Technicians, Engineers, Researchers
Criterium of validation	Regulart class attendance and expert evaluation
Number of Participants	10 participants
Registration	https://ppms.eu/pasteur/login/?pf=5
Head of the course	Adeline Mallet
Contact	ubi.all@pasteur.fr

SCREENING, MICROFLUIDICS AND ORGAN ON CHIPS

Introduction

The objective of the platform is to bridge biology and engineering in order to help the development of biomedical projects with a strong technological focus. Practically, we provide the campus with essential technological bricks and expertise in microfluidics and biomaterials. We developed in-house capabilities in the field of microfabrication, photo- and soft-lithography, advanced 3D cell culture systems, organoids and Organ-on-Chip technology especially targeted for the better understanding of complex cell-microenvironment interactions.

Basic course

Microfluidic chip design

Description: In this module, we discuss the ground rules for successful microfluidic chip design. We cover fundamental concepts such as flowrate control, microfluidic resistance, surface wetting, multilayer design, Quake valves... We provide practical training on vectorial drawing software: Clewin5.

Length: 2 h theory + 3 x 2 h practice (8 h total)

Advanced courses

Photolithography

Description: In this module, we discuss the fundamentals concept of photolithography and its use to produce microfluidic chips. Practically, we teach the SU8 based process on an MJB4 mask aligner. Training includes resin spin coating, soft and hard baking, substrate exposure, alignment and development. Finally, we show various surface treatment options on the produced substrates.

Length: 1 h theory + 2 x 4 h practice (9 h total)



Organ on Chip (emulate technology)

Description: This course is intended to cover the production of various organ on chip devices on the emulate (S1) system. After a brief recap of the literature from 2010 to now we show how to activate the S1 chip. How to load a double monolayer of cells (epithelial and endothelia) and how to culture the chips to maturity. Upon request we could cover typical down the line experiments such as permeability assessment, infection, sectioning, immunostaining...

Length: 2 h theory + 3 x 2 h practice (7 h total)

Basic course: Microfluidic Chip Design

Aim	The aim of the course is to provide basic knowledge and practical skills to produce microfluidic chips in PDMS.
Summary	This module will cover all the basic concepts of soft lithography and plasma bonding.
Duration	2 h theory + 3 x 2 h practice (8 h total)
Theoretical program	Introduction to safety measures for cutting PDMS. Waste management
Practical program	PDMS mixing curing and cutting, glass slide cleaning. O2 plasma bonding
Period	Running on demand
Language	French / English, depending on the request
Pre-Requirement	Basic BMcf training
Site of the training	Theoretical part: CFJ room; Practical: BMcf
Eligible participants	PhD students, Post-docs, Engineers, Technicians, Researchers
Criterium of validation	Class attendance
Number of Participants	3 maximum
Registration	PPMS booking system (more information on our website)
Head of the course	Samy Gobaa
Contact	bmcf@pasteur.fr

Advanced course: Photolithography	
<i>Aim</i>	The aim of the course is to provide basic knowledge and practical skills on the SU8 process.
<i>Summary</i>	This module will cover all the basic concepts of photolithography on a Süss MJB4 mask aligner.
<i>Duration</i>	1 h theory, 4 h X2 practice (9 h total)
<i>Theoretical program</i>	Introduction to microfabrication strategies. Brief recap on mask design
<i>Practical program</i>	Master mold fabrication by means of photolithography
<i>Period</i>	Running on demand
<i>Language</i>	French / English, depending on the request
<i>Pre-Requirement</i>	Basic BMcf training. Microfluidic chip design if original design
<i>Site of the training</i>	Theoretical part: CFJ room; Practical: BMcf
<i>Eligible participants</i>	PhD students, Post-docs, Engineers, Technicians, Researchers
<i>Criterium of validation</i>	Class attendance
<i>Number of Participants</i>	2 maximum
<i>Registration</i>	PPMS booking system (more information on our website)
<i>Head of the course</i>	Samy Gobaa
<i>Contact</i>	bmcf@pasteur.fr

Advanced course: Organ on Chip	
<i>Aim</i>	The aim of the course is to provide the requested training to become a certified emulate chip user.
<i>Summary</i>	This module will cover the fundamental concepts for the autonomous production of organ on chip devices.
<i>Duration</i>	1 h theory, 2 h X3 practice (7 h total)
<i>Theoretical program</i>	Introduction to OOC Technology. Brief recap on mammalian cell culture
<i>Practical program</i>	Chip activation and seeding. Culture in the Zoë machines
<i>Period</i>	Running on demand
<i>Language</i>	French / English, depending on the request
<i>Pre-Requirement</i>	Basic BMcf BSL2 training
<i>Site of the training</i>	Theoretical part: CFJ room; Practical: BMcf
<i>Eligible participants</i>	PhD students, Post-docs, Engineers, Technicians, Researchers
<i>Criterium of validation</i>	Class attendance
<i>Number of Participants</i>	1 maximum
<i>Registration</i>	PPMS booking system (more information on our website)
<i>Head of the course</i>	Samy Gobaa
<i>Contact</i>	bmcf@pasteur.fr



C2RA

Animal core facilities

Central Animal Facility Training Path

Providing access to a wide range of animal models and experimental settings in accordance with animal welfare and ethical rules

Introduction

Our core facility provides the necessary biological resources, technological support, and expertise to access to animal models.

Initial training

Project designer

Description: Training leading to a diploma to comply with the regulations on animal experimentation.

The 2-week course program is structured based on the "Arrêté du 1er février 2013 relatif à l'acquisition et à la validation des compétences des personnels des établissements utilisateurs, éleveurs et fournisseurs d'animaux utilisés à des fins scientifiques".

It covers especially the following topics: legislative, ethical and welfare aspects of using animals for scientific purposes; biology, husbandry, genetics, breeding, transgenesis, anaesthesia and analgesia of laboratory animals, experimental procedures, alternatives to animal use, handling techniques, substance administration etc. The course includes lectures from experts in the field, and practice of basic techniques on Laboratory Animal Science.

The course has been approved by the Ministry of agriculture (Approval reference: I-75Institut Pasteur-F1-14).

Length: 58.5 hours/session; 2 sessions/year

Specific training

Surgery

Description: Training leading to a diploma to comply with the regulations on animal experimentation.

The three-day course programme based on the «Arrêté du 1er février 2013 relatif à l'acquisition et à la validation des compétences des personnels des

établissements utilisateurs, éleveurs et fournisseurs d'animaux utilisés à des fins scientifiques». It includes theoretical and practical courses covering the following topics: Regulations, Design of surgical procedures, Human endpoints adapted to experimental procedures, Pre- and post-operative care, Anaesthesia, Analgesia, Asepsis, Demonstrations of the use of machines used for surgery, surgical instruments and sutures. The course includes lectures by experts in the field, and practical work to learn the basic techniques involved in surgery on laboratory animals. It has been approved by the Ministry of Agriculture (approval reference: R-75Institut Pasteur-CHIR-18).

Length: 22 hours/session; 3 sessions/year

Continuous education

Description: Training leading to a diploma in order to comply with animal experimentation regulations. Updating of knowledge and skills in terms of protection of animals used for scientific purposes.

It covers especially the ethical and welfare aspects of using animals for scientific purposes, breeding, anaesthesia and analgesia of laboratory animals, experimental procedures, alternatives to animal use, handling techniques, substance administration.

Length: 3.5 hours/training; 20 trainings/year

Use of equipments

Gas Anesthesia device Vet ABC

Description: Training in the use of the gaz anesthesia device

Training in the use of the Vet ABC for blood analysis.

Length: 1 hour



Initial Training: Project designer

<i>Aim</i>	This course involves a 2 week-training which is compulsory for scientists designing projects on rodents and lagomorphs. Training leading to a diploma to comply with the regulations on animal experimentation.
<i>Summary</i>	<p>The 2-week course program is based on the “Arrêté du 1^{er} février 2013 relatif à l’acquisition et à la validation des compétences des personnels des établissements utilisateurs, éleveurs et fournisseurs d’animaux utilisés à des fins scientifiques”.</p> <p>It covers especially the following topics: legislative, ethical and welfare aspects of using animals for scientific purposes; biology, husbandry, genetics, breeding, transgenesis, anesthesia and analgesia of laboratory animals, experimental procedures, alternatives to animal use, handling techniques, substance administration etc. The course includes lectures from experts in the field, and practice of basic techniques on Laboratory Animal Science.</p> <p>The course has been approved by the Ministry of agriculture (Approval reference: I-75Institut Pasteur-F1-14).</p>
<i>Duration</i>	10 days (58.5 h total)
<i>Theoretical program</i>	55.5 h
<i>Practical program</i>	3 h
<i>Period</i>	Running on demand
<i>Language</i>	English
<i>Pre-Requirement</i>	5 years of higher education or 2 years with 5 years of experience
<i>Associated course</i>	None
<i>Site of the training</i>	Centre d'Enseignement
<i>Eligible participants</i>	Researcher, Engineer, Post-doc, student. Training open to external candidates
<i>Criterium of validation</i>	Regular class attendance and exam
<i>Number of Participants</i>	60 places
<i>Registration</i>	https://www.pasteur.fr/en/education/programs-and-courses/pasteur-courses?id_cours=32236
<i>Head of the course</i>	Myriam Mattein, Marion Bérard
<i>Contact</i>	enseignement@pasteur.fr

Specific Training: Surgery

<i>Aim</i>	This course includes a mandatory 3-day training course for scientists performing surgical procedures. This is appropriate for training in surgical interventions on rodents (mice and rats). Training leading to a diploma to comply with the regulations on animal experimentation.
<i>Summary</i>	<p>The three-day course programme based on the «Arrêté du 1^{er} février 2013 relatif à l’acquisition et à la validation des compétences des personnels des établissements utilisateurs, éleveurs et fournisseurs d’animaux utilisés à des fins scientifiques». It includes theoretical and practical courses covering the following topics: Regulations, Design of surgical procedures, Human endpoints adapted to experimental procedures, Pre- and post-operative care, Anesthesia, Analgesia, Asepsis, Demonstrations of the use of machines used for surgery, surgical instruments and sutures. The course includes lectures by experts in the field, and practical work to learn the basic techniques involved in surgery on laboratory animals. It has been approved by the Ministry of Agriculture (approval reference: R-75Institut Pasteur-CHIR-18).</p>
<i>Duration</i>	3 days (22 h total)
<i>Theoretical program</i>	14 h
<i>Practical program</i>	8 h
<i>Period</i>	Running on demand
<i>Language</i>	French / English, depending on the request
<i>Pre-Requirement</i>	Project designer or practician diploma. Training open to external candidates
<i>Associated course</i>	None
<i>Site of the training</i>	Education building
<i>Eligible participants</i>	Researcher, Engineer, Doctoral student, Post-doc, Technician, Trainee
<i>Criterium of validation</i>	Regular class attendance and exam
<i>Number of Participants</i>	14 places
<i>Registration</i>	https://www.pasteur.fr/en/education/programs-and-courses/pasteur-courses?id_cours=32236
<i>Head of the course</i>	Myriam Mattein, Marion Bérard
<i>Contact</i>	enseignement@pasteur.fr

Specific Training: Continous education

Aim	Training leading to a certificate of completion of the training to comply with the regulations on animal experimentation.
Summary	Update knowledge and skills on the protection of animals used for scientific purposes. It covers especially the ethical and welfare aspects, breeding, statistics, anaesthesia and analgesia of laboratory animals, experimental procedures, alternatives to animal use, handling techniques, substance administration.
Duration	3.5 hours
Theoretical program	10 trainings
Practical program	10 trainings
Period	20 trainings per year
Language	French / English, depending on the request
Pre-Requirement	Project designer or practician diploma
Associated course	None
Site of the training	COSAC training room Animalerie Centrale. Meeting rooms
Eligible participants	Researcher, Engineer, Doctoral student, Post-doc, Technician, Trainee
Criterium of validation	Regular class attendance and 3 days of training over the last 6 years
Number of Participants	10 to 40 places
Registration	sbea-anim@pasteur.fr
Head of the course	Myriam Mattein
Contact	sbea-anim@pasteur.fr

Specific Training: Equipements use: Gas Anesthesia Device & VET'ABC

Aim	- Acquisition of autonomous use of the Gas anesthesia machine - Acquisition of autonomous use of the VET'ABC machine
Summary	Training in the use of the gaz anesthesia device Training in the use of the Vet ABC for blood analysis
Duration	1 h for each device
Theoretical program	15 min
Practical program	45 min
Period	12 per year
Language	French / English, depending on the request
Pre-Requirement	None
Associated course	None
Site of the training	Education building
Eligible participants	Researcher, Engineer, Doctoral student, Post-doc, Technician, Trainee
Criterium of validation	Regular class attendance
Number of Participants	10 to 40 places
Registration	sbea-anim@pasteur.fr
Head of the course	Myriam Mattein
Contact	sbea-anim@pasteur.fr

Histopathology Core Facility

Offer state-of the art histotechnological laboratory with a specialized team

Introduction

Our platform is available for histotechnological collaborative research. Many projects are currently ongoing on animal models of infectious diseases, cancer, immunotherapy or inflammation with internal or external research teams. Individuals wishing to develop collaborative research efforts are encouraged to contact us when developing research projects. Optimal results are obtained when the staff is contacted as early as possible in the conception of the in vivo part of the project; this allows us to help determine how histological approach can best support the research aim.

Basic courses

Introduction to the basics of Histology and Immunostaining

Goals:

- Acquire basics in histology in order to know the sample preparation process
- Know the different principles of histology and the different key stages of each histology technique
- Understand the techniques of immunohistochemistry and immunofluorescence.

Programm:

- Preparation of samples: Fixation technique, decalcification, re-cutting of parts, dehydration, inclusion of samples, cutting of blocks.
- Histological staining: Principle, example of staining.
- Principle of immunohistochemistry techniques: existing techniques, different steps.
- Principle of immunofluorescence: Existing techniques, different steps.
- Observation methods: Bright field microscopy, fluorescence microscopy, scanner.

- Analysis methods: manual method, analysis software (image J, Fiji)

Length: 5 half days, 1 sessions/year

Theory: 1 half day

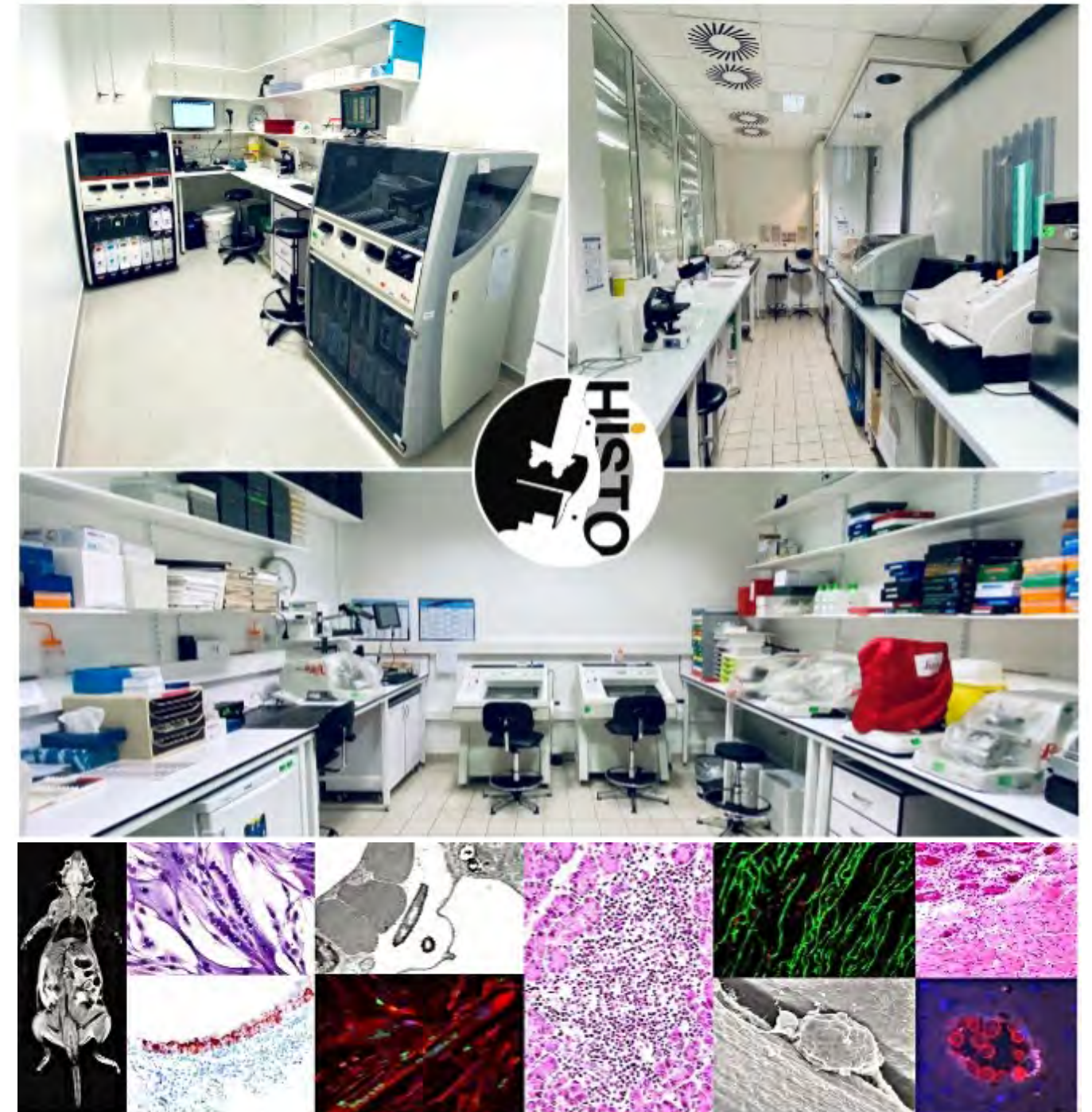
Practice: 4 half-days

Systems trainings

Cryostat, Microtome, Vibratome

Description: To use the platform's equipment (cryostats, microtomes, vibratomes), a training on this equipment is mandatory. This training will allow you to use the equipment safely and to be able to study your biological samples.

Length: 2 hours/system (Theory & Practice)



Introduction to the basics of Histology and Immunostaining

<i>Aim</i>	This course provides knowledge of the basics of histotechnology.
<i>Summary</i>	The 1-week course program is based on acquisition of basics in Histology in order to know how to process your histology sample, to know the different principles of histology and the different key stages of each histology technique and to Understand the techniques of immunohistochemistry and immunofluorescence.
<i>Duration</i>	5 half-days, 15 hours total
<i>Theoretical program</i>	3 h
<i>Practical program</i>	12 h
<i>Period</i>	Once a year
<i>Language</i>	French / English, depending on the request
<i>Pre-Requirement</i>	Notions of biology
<i>Associated course</i>	None
<i>Site of the training</i>	Histopathology core Facility
<i>Eligible participants</i>	Researcher, Engineer, Doctoral student, Post-doc, Technician. Training open to external candidates soon
<i>Criterion of validation</i>	Histopathology exam
<i>Number of Participants</i>	12 places
<i>Registration</i>	https://www.pasteur.fr/en/education/programs-and-courses/pasteur-courses
<i>Head of the course</i>	David Hardy
<i>Contact</i>	enseignement@pasteur.fr

Systems trainings

<i>Aim</i>	System training on Cryostat, Microtome or Vibratome
<i>Summary</i>	To use the platform's equipment (cryostats, microtomes, vibratomes), a training on this equipment is mandatory. This training will allow you to use the equipment safely and to be able to study your biological samples.
<i>Duration</i>	2 h per system
<i>Theoretical program</i>	0.5 h
<i>Practical program</i>	1.5 h
<i>Period</i>	Once a year
<i>Language</i>	French / English, depending on the request
<i>Pre-Requirement</i>	Notions of biology
<i>Associated course</i>	None
<i>Site of the training</i>	Histopathology core Facility
<i>Eligible participants</i>	Researcher, Engineer, Doctoral student, Post-doc, Technician. Training open to external candidates soon
<i>Criterion of validation</i>	Histopathology exam
<i>Number of Participants</i>	12 places
<i>Registration</i>	historequest@pasteur.fr
<i>Head of the course</i>	David Hardy
<i>Contact</i>	historequest@pasteur.fr



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