

Overview of the residential school programme (see detailed schedule)

This residential school will take place over two weeks in November 2026 at Cheikh Anta Diop University (UCAD), Senegal. Each day will follow a structured format, with mornings dedicated to knowledge dissemination and exchange:

Morning sessions will begin with a 1–2 hour lecture covering both fundamental and advanced topics in biological imaging, followed by a one-hour keynote lecture and a one-hour presentation or seminar focused on a specific scientific topic. These sessions are designed to be accessible to a broad audience. In addition to the on-site participants, they will be open via videoconference to students, faculty members, researchers, engineers, and technicians from various UCAD departments (Plant Biology, Marine Biology, Animal Biology, Health Sciences, Ecology, etc.), as well as to colleagues outside Dakar and beyond Senegal, subject to prior registration. Presentations will alternate between African and French speakers, ensuring a balanced exchange of perspectives and expertise. This alternation will apply to all main lectures, keynote talks, and scientific presentations, which will be delivered either in person or via videoconference.

Afternoon sessions will be devoted to more practical workshops (indicated as practical sessions), covering the full experimental workflow in biological imaging - from sample preparation to image data analysis - ranging from basic to advanced techniques. The trainers (at least four experts, two from France and two from Senegal) will supervise 20 to 25 selected participants, typically working in small groups. Some practical workshops will be organized around various microscopy equipment (epifluorescence and phase-contrast microscopes, low-cost open-source systems, etc.), while others will be conducted virtually and remotely, using image data libraries for image analysis training.

Round tables and dedicated discussion sessions focusing on shared scientific interests, microscopy topics, and imaging facility management will complement the programme. These exchanges are expected to foster new collaborations and strengthen the consortium, with the objective of applying for future funding programmes, as outlined in the main proposal document.

All invited speakers have confirmed their participation, subject to project funding.

PROVISIONAL PROGRAMME OF THE BEAMS RESIDENTIAL SCHOOL:

Week 1					
	Monday	Tuesday	Wednesday	Thursday	Friday
9.00 -10.00	Venue, Registration	Course, Presential Prof. Aliou NDYAYE, UCAD, Sénégal: Diversity of Anatomical Structures in Plants	Course, Presential Prof. Khadi DIOUF, UCAD, Sénégal: Diversity of Marine Organisms	Course, Presential Dr. Malick NDIAYE, UCAD, Sénégal : Cartographie, coloration histochimiques	Course (remotely) :
10-11.00	Welcome, Presentation Programme Objectives Prof. Aliou NDYAYE, UCAD, Sénégal Prof Khady NDIIOUF, UCAD, Sénégal Dr. Samira Benadda, IBENS-CNRS, Paris Dr. Jean Luc VERDEIL, CIRAD, Montpellier	Conference, Presential Prof. Khady DIOUF, Marine Biology Laboratory, Sénégal: Study of otolith shape as a tool for determining the stock structure of sole (Cynoglossus senegalensis) by Image analysis: towards sustainable management of fishery resources	Conference, Presential Dr. Malick NDIAYE, UCAD, Sénégal: Study of the interface of native endomycorrhizae using high-resolution microanalysis methods	Keynote, Remotely Prof. Lars STEMMANN, SU-LOV, Villefranche sur Mer: Impacts of anthropogenic activities on micro-algal diversity, a biological indicator of marine	Dr. Anne-Sophie MACE, CNRS-Institut Curie, Paris Image processing and analysis PART I : Short presentation ImageJ/Fiji -Digital imaging in biology: Introduction to 2D and 3D image analysis -Optimization of image visualization. -Artifact and noise reduction treatments.
11.00 -11.25	Coffee break	Coffee break	Coffee break	Coffee break	

11.30 - 12.30	Introductory session, Presental: Dr. Jean SALAMERO, FBI-CNRS, Montpellier and Dr. Jean-Luc VERDEIL, CIRAD, Montpellier Contribution of biological imaging in life sciences (with concrete examples in marine, plant , animal & human biology)	Conference, Presential: Dr. Petra BULANKOVA (IBENS-CNRS, Paris) Diatoms- Tiny algae with a big impact	Keynote, Remotely: Dr.Chris BOWLER, IBENS-CNRS, Paris : Revealing novel cell biology in marine protists	Keynote, Presential: Prof. Brice TONFACK ,Univ Yaoundé, Cameroon: Phenotyping the seed diversity in orphan undervalued tropical plant genus Aframomum using bioimaging- microscopic tools	Break Free
12.30-14.00	Lunch with speakers and instructors				Lunch with speakers and instructors
14.00 -17.00	Course, Presential : Dr. Jean SALAMERO, FBI-CNRS, Montpellier : PART I (Basic notions) -Photonic Microscopy -theory on fluorescence -Resolution: OTF/PSF Abbe and Nyquist limits -Measuring SNR; detector review (performances and limits) Shot and Gaussian noise, how to reduce it? (classical filters and more advanced denoising approaches) Course, Présential : Dr. Samira BENADDA , IBENS-CNRS, Paris Dr. Julien FERNANDES, Institut Pasteur, Paris : Basics of cell biology, Presentation of different imaging techniques	TP in Parallell 4 Groups (6 -7 Students) Instructors Dr. Samira BENADDA, IBENS-CNRS, Dr. Jean-Luc VERDEIL, CIRAD, Montpellier, Dr. Julien FERNANDES, Institut Pasteur,Paris Dr. Jean SALAMERO, FBI-CNRS, Ndéye Ounane SARR, UCAD, Sénégal, Oumar JOHNSON, UCAD, Sénégal: How to plan your experiments, Prepare a protocol, Immunofluorescence, Staining, Mounting, acquisition, Control, Histochemical staining: live learning with sample slides, exchange breaks, discussions	TP in Parallell 4 Groups (6 -7 Students) Instructors Dr. Samira BENADDA, IBENS-CNRS, Dr. Jean-Luc VERDEIL, CIRAD, Montpellier, Dr. Julien FERNANDES, Institut Pasteur, Paris Ndéye Ounane SARR, UCAD, Sénégal, Dr. Jean SALAMERO, FBI- CNRS, Oumar JOHNSON, UCAD, Sénégal Preparation Samples on site	TP in Parallell 2 Groups (12 Students) Instructors Dr. Samira BENADDA, IBENS-CNRS, Dr. Jean-Luc VERDEIL, CIRAD, Montpellier, Dr. Julien FERNANDES, Institut Pasteur,Paris Ndéye Ounane SARR, UCAD, Sénégal, Oumar JOHNSON, UCAD, Sénégal, One instructor from ISRA-CRODT (TBD),Senegal TP Microscopie: Kholer, nettoyage, reglage, alignement, filtre TP Presentation and use of the PlanktoScope-open source system	TP in Parallell 2 Groups (12 Students) Instructors Dr. Samira BENADDA, IBENS-CNRS, Dr. Jean-Luc VERDEIL, CIRAD, Montpellier, Dr. Julien FERNANDES, Institut Pasteur,Paris Ndéye Ounane SARR, UCAD, Sénégal, Oumar JOHNSON, UCAD, Sénégal, One instructor from ISRA-CRODT (TBD),Senegal TP Microscopie: Kholer, nettoyage, reglage, alignement, filtre TP Presentation and use of the PlanktoScope-open source system
17.00 -18.00	Dinner Free	Session Poster	Get together & School Diner	Dinner Free	Dinner Free
	Week 2				
	Monday	Tuesday	Wednesday	Thursday	Friday
9.00 -10.00	Course , Presential: Dr. Jean SALAMERO (FBI-CNRS, Montpellier) : PART II Advanced Microscopy: -Multiscale Imaging(3D): from simple wide field deconvolution to advanced optical slicing technics and 3D rendering (CLSM, Nipkov SD, Light sheet....) "What to use and when is it best?" - Multiscale Imaging (3D+time). The "yin and the yang" of the light illumination on live matter (photobleaching and phototoxicity/ photon budget)	Institut Curie, Paris: Advanced image analysis -Pre-processing -Segmentation methods, counting, automated object analysis and use of AI in this context (description of open source software tools, Stardist, Cellpose...) -Object colocalization analysis -Initiation to tracking (2D + Time) using "Trackmate" software	Course , Presential: Prof. Rokhaya N'DIAYE DIALLO, UCAD, Sénégal Basic principles of immunohistochemistry and in situ hybridization of plants and marine health	Course , Presential: Prof. Aliou N'DIAYE, UCAD, Sénégal : Exploitation of autofluorescence	Course , Presential: Prof. Agathe FOTIO LAMBOU, BUEA UNIV, Cameroun Prophylactic and curative effects of medicinal plant extracts. Risk associated to pesticide misuse on environment, animal and human
10.00 -11.00	Conference, Presential: Dr. Jean-Luc VERDEIL, CIRAD, Montpellier: Anatomic phenotyping of crop plants	Keynote, Presential or Remotely: Dr Belkacem ZAROURI, CRBT, Algeria: Plant biodiversity at the service of agriculture: Assessment and monitoring based on molecular tools	Conference, Presential: Prof. Aliou N'DIAYE, UCAD, Sénégal : Protoplast observation and wall synthesis monitoring	Conference, Presential: Dr. Bassirou DIALLO, ISRA, Sénégal : Developmental stage from the callogenesis to organogenesis to detect signs of morphogenesis of the structures such as embryogenic calluses and meristematic cells	Course, Remotely : Ptissam BERGAM, CNRS-Institut Curie , Paris : Sample Preparation to TEM Observation Example Sample Tomo Cryo Marine Bacteria, Marine Sponge Imaging
11.00 -11.25	Coffee break	Coffee break	Coffee break	Coffee break	Feedback ,New projects, Conclusion
11.30 - 12.30	Keynote, Presential: Prof. Kossi SEGHA, Forest research laboratory, Togo : Analysis of the anatomical characteristics of Pterocarpus erinaceus wood using the Nikon Eclipse NI-E Epifluorescence Microscope".	Keynote, Presential or Remotely: Dr. Daphnée Autran, PHIV-MRI , UMR DIADE, Montpellier: 3D and 4D imaging of plant ovules to understand the plasticity of female germ cells fate and reproductive modes	Keynote, Presential or Remotely: Dr. Laurent LAPLAZE, IRD, Montpellier : The contribution of imaging to root development in Mile	Conference, Presential: Dr. Samira BENADDA, IBENS-CNRS, Paris: Management of core Facility	Cloture
12.30-14.00	Lunch with speakers and instructors				
	TP in parallel: 3 groups (8-9 students) Dr. Jean-Luc VERDEIL, CIRAD, Montpellier AND Oumar JOHNSON, UCAD, Sénégal: Staining Application of anatomical phenotyping on Sorgo, freehand sections, staining, microscope observation, image capture, definition of anatomical descriptors, data processing, TP in parallel : Dr. Jean SALAMERO, FBI-CNRS, France	Round Table: Chairman Prof. Rochhaya N'DIAYE DIALLO, UCAD, Sénégal : Autofluorescence and fluorescent labeling, Round tables Situational analysis, how to do it, case studies		Breakout Groups: 4 groups Dr. Samira BENADDA, IBENS-CNRS, Dr. Jean-Luc VERDEIL, CIRAD, Montpellier, Dr. Julien FERNANDES, Institut Pasteur, Paris Dr. Jean SALAMERO, FBI- CNRS, Montpellier Ndéye Ounane SARR, UCAD, Sénégal, Oumar JOHNSON, UCAD, Sénégal : Platform management, what is important in your standards and how they can adapt to our environment	

14.00 -18.00	Ndéye OUNANE Sarr, UCAD, Sénégal: (on pre-prepared slides) Fluorescent immunolabeling protocols on cells. Microscope observation (Axio-observer microscope), cell compartmentalization and identification, pre-processing of fluorescence images (denoising, overlay, co-localization). TP in parallél: Dr. Petra BULANKOVA, IBENS-CNRS, Paris Samira Benadda, IBENS-CNRS, Paris Marine Biology Expansion microscopy, Diatome , Staining	Round Table: Chairman Prof. Aliou N'DIAYE, UCAD, Sénégal: Identification of future technical and technological needs based on their research themes	Day off - free time	TP Instructors: Dr. Samira BENADDA, IBENS-CNRS, Dr. Jean-Luc VERDEIL, CIRAD, Montpellier, Dr. Julien FERNANDES, Institut Pasteur, Ndéye Ounane SARR, UCAD, Sénégal, Oumar JOHNSON, UCAD, Sénégal : TP Image Analysis in computer, Introduction Image J, Brightness and contrast, Filters, Intensity
19.00 -20.00	Dinner Free			Dinner Free

COURSE
KEYNOTEs & CONFERENCES
TP
BREAK
SESSION POSTER
EVENTS
Round Table