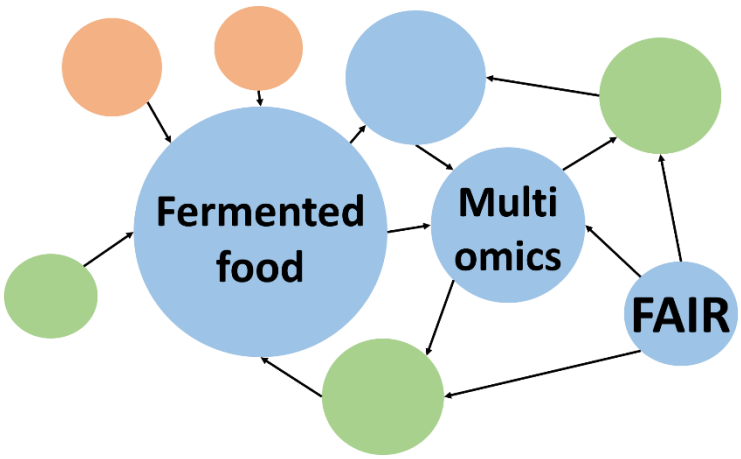
Summer School n°1 - Agenda – 2-13th June 2025

FAIROmics

Summer School n°1

AGENDA

- **Time:** Central European Time
- **Location: Palaiseau / ISC-PIF / Gif-sur-Yvette**
- **Online**: https://inrae-fr.zoom.us/j/92110132316?pwd=TTjVvtipSvu19V45nnAPEkbjanQGvV.1 (ID : 921 1013 2316).
- **Zoom session password**: Summer#06!



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Programme Overview

Date	**2 June**	**3 June**	**4 June**	**5 June**	**6 June**
Location	**Palaiseau**	**ISC-PIF**	**ISC-PIF**	**ISC-PIF**	**ISC-PIF**
Morning 9h30-13h	Introduction to Biology/Ecology Practical plant-based food	Omics introduction	Law aspects	Life-cycle Assessment	FAIR Bioinfo
Afternoon 14h-17h30	Practical plant-based food	Statistics for omics	Law aspects	FAIR Bioinfo	Consumer science

Date	**9 June**	**10 June**	**11 June**	**12 June**	**13 June**
Location		**Palaiseau**	**Gif sur Yvette**	**ISC-PIF**	**ISC-PIF**
Morning 9h30-13h		Practical plant-based food	Danone Starters and fermentation	Natural Language Processing Introduction	Knowledge graphs advanced
Afternoon 14h-17h30		Sensory perception	Danone premises visit	Knowledge graphs introduction	Omics advanced

DAY 1 - 2 JUNE 2025 : Introduction to Biology & Microbial Ecology:

- **Location: Campus Agro-Paris Saclay, 22 Place de L'Agronomie, 91120 Palaiseau.**
  E Building (SayFood) – Room E1.505.
- **Supervision by Éric Dugat-Bony (INRAE)**

9:30-11:00	This course aims to provide all attendees, especially non-biologists, with fundamental knowledge of biology and microbial ecology. The goal is to establish a common language for future project meetings. It will cover the different forms of life, the building blocks of life, key cellular processes, microbial interactions, and an overview of the methods to study them.

DAY 1 - 2 JUNE 2025 : Practial plant-based food:

- **Location: Campus Agro-Paris Saclay, 22 Place de L'Agronomie, 91120 Palaiseau.**
  E Building (SayFood) – Room E1.505.
- **Supervision by Sandra Helinck and Sophie Landaud (INRAE SayFood)**

11:00-12:30	Compare different commercially available fermented vegetable products (FVP) as alternatives to yoghurts: labelling, composition, shelf-life, pH, etc…
12:30-13:30	***Lunch Break***

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13:30-15:00	To consider experimental trials to produce FVP from different matrices (soya milk, pea protein isolate) with different strains and different formulations (addition of sugars). In particular, what parameters can be measured to assess sanitary quality and sensory quality, and thus compare conditions? Publications will be provided, as well as a list of available material and strains (technical data sheets).
15:00-17:00	After validation of the protocols: implement the experiments.

DAY 2 - 3 JUNE 2025-: Omics Introduction:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris).**
  1st Floor, Room 1.1 & 1.2
- **Supervision by Vincent Hervé (INRAE SayFood)**

9:30-12:30	This introductory course will give an overview the various Omics methods frequently used in microbial ecology such as culturomics, (meta)genomics, (meta)transcriptomics, proteomics and metabolomics. For each method, we will discuss case studies, limitations as well as pros and cons. We will also provide a list of available resources (databases, software, workflows...) for further reading and exploration.
12:30-14:00	*Lunch break*

DAY 2 - 3 JUNE 2025: Statistics for Omics:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris).**
  1st Floor, Room 1.1 & 1.2
- **Supervision by Sébastien Déjean (UT3)**

14:00-15:15	• Introduction: Follow the roadmap: Problem - Plan - Data - Analysis – Conclusion • Problem: need to ask a precise question • Plan: methods to be used, experimental design • Data: reliability, precision, replicates, metadata (FAIR) • Analysis: tidyness, missingness, outliers, transformation • From Analysis to Conclusion: Interpret results: mean, variance, correlation, statistical testing and p-value, ANOVA, Principal Component Analysis, clustering • Conclusion: often a refined question...
15:15-15:30	*Coffee Break*

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15:30-16:30	Hands on R : • How to find and use help • Data structures: focus on data.frame, tibble • How to use functions • Import / Export data • A bit of statistics: summary, graphical output (histogram, boxplot, barplot), statistical test, clustering
16:30-17:00	Demo mixOmics: mixOmics offers a wide range of multivariate methods for the exploration and integration of biological datasets : • Single-omics unsupervised analysis (Principal Component Analysis) • Single-omics supervised analysis (Projection to Latent Structure - Discriminant Analysis, PLS-DA) • Multi-omics unsupervised analysis (Multi-block PLS) • Multi-omics supervised analysis (Multi-block PLS-DA) • Multi-group analyses (Mint-PCA, Mint-PLS...)

DAY 3 - 4 JUNE 2025: Law Aspects:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris). 1st Floor, Room 1.1 & 1.2**
- **Supervision by Julien Cabay (ULB)**

9:30-12:30	Law Aspects.
12:30-13:30	***Lunch Break***
13:30-17:30	Law Aspects.

DAY 4 - 5 JUNE 2025: Life-cycle Assessment:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris). 1st Floor, Room 1.1 & 1.2**
- **Supervision by Caroline Pénicaud (INRAE SayFood)**

General objectives:

- Sensitise to the question of food and food production sustainability: favouring the shift from a citizen mindset to a scientist mindset to engage the researchers of tomorrow.
- Show the field of application and the associated constraints of Life Cycle Assessment, the reference tool for environmental assessment.

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- Think about the implications for each DC project.

9:30-10:00	Life Cycle Assessment (LCA): the reference tool for environmental assessment. The objective is to provide sufficient background on LCA to understand the methodology.
10:00-10:30	Assessment of fermented vegetable foods with LCA. The objective is to show LCA application to the case-study of fermented vegetable foods.
10:30-11:00	*Coffee break*
11:00-12:20	Workshop on LCA practice.
12:20-13:00	What does this inspire you in relation to the stakes of your thesis projects? Format: working groups + individual restitution + collective production.
13:00-14:00	*Lunch break*

DAY 4 - 5 JUNE 2025: FAIR Bioinfo:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris).**
  1st Floor, Room 1.1 & 1.2
- **Supervision by IFB team**

This training provides an introduction to the main tools for making bioinformatics more FAIR (Findable, Accessible, Interoperable, Reusable). Through both theoretical and practical sessions, participants will explore key concepts and learn how to use essential tools to enhance data management, sharing, and reuse in bioinformatics. The goal is to comprehensively understand best practices while applying these tools to real-world scenarios.

14:00-15:00	Theory – FAIR principles applied to bioinformatics.
15:00-16:00	Theory & Workshop – Introduction to Git (add, rm, commit, checkout). Creating an online repository (push, pull).
16:00-16:15	*Coffee break*
16:15-17:15	Theory & Workshop – Introduction to Git (branches, adding a license, contributor, etc).

DAY 5 - 6 JUNE 2025: FAIR Bioinfo:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris).**
  1st Floor, Room 1.1 & 1.2
- **Supervision by IFB team**

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9:30-10:30	Theory & Workshop – Introduction to Notebooks (Jupyter/Quarto).
10:30-11:15	Theory – Introduction to controlled environments (Conda, Docker, Apptainer).
11:15-12:00	Theory – Overview of workflow systems (Snakemake/Nextflow).
12:00-12:15	*Coffee break*
12:15-12:45	Theory – Code sharing (Zenodo, Software Heritage).
12:45-14:00	*Lunch break*

DAY 5 - 6 JUNE 2025: Consumer Science:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris). 1st Floor, Room 1.1 & 1.2**
- **Supervision by Lucia Brisset (INRAE SayFood)**

14:00-17:30	This course provides information on: 1. Introduction to sensory science. 2. Presentation of basic elements of physiological and psychological aspects of perception and knowledge about individual diversity. 3. Introduction to the main types of sensory methodologies (with a focus on methods of discriminative and descriptive analysis) and best practice when conducting these methods. 4. Knowledge about product preference and consumer understanding (formation of preferences, food choice, hedonic testing, to identify the role of context). 5. Introduction to participative science.

DAY 6 - 10 JUNE 2025: Practial plant-based food:

- **Location: Campus Agro-Paris Saclay, 22 Place de L'Agronomie, 91120 Palaiseau. E Building (SayFood) – Room E1.505.**
- **Supervision by Sandra Helinck and Sophie Landaud (INRAE SayFood)**

9:30-13:00	Analyse the results and conclude on the experimental trials and compare with commercial products.

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13:00-14:00	*Lunch break*

DAY 6 - 10 JUNE 2025: Sensory Perception:

- **Location: Campus Agro-Paris Saclay, 22 Place de L'Agronomie, 91120 Palaiseau. E Building (SayFood) – Room E1.505.**
- **Supervision by Anne Saint-Eve & Lucia Brisset (INRAE SayFood)**

14:00-17:30	Practice: 1. Introduction to the sensory dimensions of taste and odour and application to different sensory analysis methods. 2. Conduct practical sensory profile on fermented legume-based products. 3. Conduct practical focus group on the future concept of fermented legume-based products in sustainable diets.

DAY 7 - 11 JUNE 2025: Starters and fermentation:

- **Location: Danone Research & Innovation – Daniel Carasso Center – Paris Saclay (Zac du Moulon, RD128, 91190 Gif-sur-Yvette).**
- **Supervision by Laurent Marchal & Valentina Fernandez-Benoist (Danone)**

9:30-13:00	• Basics on ferments, probiotics and yoghurt fermentation. • Focus on Collection and Screening. • Focus on Ferment Development. • Focus on Genetics / Transcriptomics. • Focus on AI / Data Management / Modelling.
13:00-14:00	*Lunch Break*
14:00-17:00	Visit of the Laboratories: • Life Science Laboratory. • Food Laboratory. • Analytical Science (to be confirmed). • Global overview of the pilot and video on the Bioprocess pilot.

DAY 8 - 12 JUNE 2025: Natural Language Processing Introduction:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris). 1st Floor, Room 1.1 & 1.2**
- **Supervision by Robert Bossy & Claire Nedellec (INRAE MAiAGE)**

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9:30-13:00	Introduction to Ontology-based Natural Language Processing.
13:00-14:00	*Lunch break*

DAY 8 - 12 JUNE 2025: Knowledge graphs introduction:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris). 1st Floor, Room 1.1 & 1.2**
- **Supervision by Axel Ngonga & Mohamed Sherif (Paderborn University)**

14:00-17:30	Knowledge graphs introduction.

DAY 9 - 13 JUNE 2025: Knowledge graphs advanced:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris). 1st Floor, Room 1.1 & 1.2**
- **Supervision by Axel Ngonga & Mohamed Sherif (Paderborn University)**

9:30-13:00	Knowledge graphs advanced.
13:00-14:00	*Lunch break*

DAY 9 - 13 JUNE 2025: Omics advanced:

- **Location: Complex Systems Institute (ISC-PIF, 113 Rue Nationale, 75013 Paris). 1st Floor, Room 1.1 & 1.2**
- **Supervision by Éric Dugat-Bony and Vincent Hervé (INRAE SayFood)**

14:00-17:30	In this course, we will explore the processing of selected omics data: - (Meta)genomics: reconstruction of genomes from metagenomes, gene/protein catalogues and their applications, analysis of pangenomes. - (Meta)transcriptomics: experimental design, analysis workflow and tools, statistical analysis. - Metabolomics: experimental design, analysis workflow and tools, statistical analysis. This will bring us to discuss the integration of multi-omics data and metabolic network reconstruction. The course will conclude with an open session where we can collectively discuss your own experimental plans.

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