

OFFRE DE STAGE

Internship: coupling dimension reduction and classification methods to identify sentry micro-organisms for plant health infections.

Scientific context: Microbial communities are an essential component of plant health. Interacting with the host, these communities play a key role in limiting the invasion of microbial pathogens. Better characterizing these communities with simple indicators could pave the way for microbial biocontrol solutions against pathogens, thereby limiting pesticide use.

Goal : The scientific objective of this internship is to develop methods for analyzing omics data in order to determine simplified markers for monitoring microbial communities associated with plants. In particular, the aim is to develop a new method combining dimension reduction, classification and variable selection to determine a subset of microorganisms associated with infection of grapevines by a fungal pathogen, downy mildew. These selected micro-organisms can be used as early indicators of infection, which will be validated on an independent dataset. The ultimate aim is to monitor these sentry micro-organisms in environmental samples, enabling early diagnosis of infection and reduced pesticide use.

- You will be in charge of :
 - Developing a new method coupling dimension reduction, classification and variable selection.
 - Analyzing metataxonomic data obtained in plots with low and high levels of grapevine downy mildew during the last years, to determine a list of around 50 micro-organisms that could serve as sentry micro-organisms.
 - Developing digital tools for analysis (python or R).

■ **Key words :** data science, dimension reduction, classification, variable selection, omics data.

■ Specific working conditions: full-time. The candidate will divide his/her time between the Biogeco unit (Cestas) and the Pléiade team (Inria Bordeaux Sud-Ouest).

Skills and profile

■ Recommended training: Master's degree or engineering school in applied mathematics, statistics, theoretical ecology

■ Desired skills: knowledge of applied mathematics (linear algebra, optimization) or data science (dimension reduction, classification, clustering), programming (Python or R).

■ Desired skills: an interest in life sciences and the application of mathematics is desirable.

Modalités d'accueil

The Institut national de recherche pour l'agriculture, l'alimentation et l'environnement (INRAE) is a public research establishment bringing together a working community of 12,000 people, with 268 research, service and experimental units, located in 18 centers throughout France. INRAE is a world leader in agricultural and food sciences, plant and animal sciences. Its research aims to build solutions for multi-performance agriculture, quality food and sustainable management of resources and ecosystems.

■ You will be working at the UMR "Biodiversity, Genes and Communities" (BIOGECO), a unit comprising over 100 people employed by INRAE and the University of Bordeaux. The aim of our research unit is to study terrestrial biodiversity, from genes to communities, with a view to the sustainable management of ecosystems. You will develop your research within the Pléiade team (INRAE/Inria team also housed at the Inria center in Bordeaux Sud-Ouest), which develops tools and numerical methods to study the association of species within microbial communities according

to spatio-temporal and environmental determinants. The internship will be co-supervised by an expert in microbial ecology.

↳ Hospitality

- **Where** : Unité: Biogeco and Inria BSO
- **ZIP code, city** : 33600 Cestas
- **Internship**
- **Duration** : 5 to 6 months
- **From** : february 2025

↳ Modalités pour postuler

Send CV and motivation letter to :
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📅 **before** : 01-12-2024