Meta_Microbial Workshop 2024

Metagenomic and bioinformatic insights into microbial communities

September 4th – 6th

Location: Faculdade de Ciências da Universidade do Porto (FCUP), Departamento de Biologia.
Address: Rua do Campo Alegre, s/n, 4169-007 Porto, Portugal. **Building FC4, Rooms 011/012.**

Instructors
- Adriana Rego (AR). Postdoctoral Researcher at CIIMAR.
- Catarina Magalhães (CM). Team Leader at CIIMAR and Assistant Professor at FCUP.
- Francisco Pascoal (FP). PhD Student at CIIMAR and FCUP.
- Leandro Pereira (computational support). Researcher at CIIMAR.
- Miguel Semedo (MS). Junior Researcher at CIIMAR.
- Nicola Gambardella (NG). Fellow Researcher at CIIMAR.

AGENDA

Day 1 - September 4th, 2024

Time	Agenda item
09:15 - 09:30h	**Participants registration**
09:30 - 09:45h	**Welcome session and program overview** - All instructors
09:45 - 10:15h	**Next-generation sequencing technologies and data generation** (MS) - Short Lecture
10:15 – 10:45h	**Sampling protocols and standardization** (CM + FP) - Short Lecture
10:45 - 11:00h	Break
11:00 - 12:00h	**R tools for microbial ecology studies** (FP) - Lecture and brief practical examples
12:00 - 13:00h	**Python in microbial ecology studies** (NG) - Lecture and brief practical examples
13:00 - 14:00h	Lunch
14:00 - 16:00h	**Metabarcoding (amplicon sequencing) analysis workflow** (FP + MS) - Lecture and brief practical examples (*dada2*, *phyloseq*, *vegan*, *picrust2*, ...) - 16S rRNA gene reads processing (short and long reads) - Ecological analysis (alpha- and beta- diversity)
16:00 – 17:00h	**Coffee and Posters Session**

Day 2 - September 5th, 2024

Time	Agenda item
09:30 – 10:15h	**Exploring Online Resources and Repositories I** (CM) - Practical example (*Silva NGS*)
10:15 – 11:00h	**Insights on data visualization and analysis** (FP) - Lecture and brief practical examples
11:00 - 11:15h	Break
11:15 - 13:00h	**Metagenomics (shotgun sequencing) analysis workflow** (AR + MS) - Lecture and brief practical examples - Raw reads processing (*trimmomatic*, *megahit*, *concoct*, ...) - Taxa and functional annotation (*bowtie2*, *prokka*, *GTDB*, ...)
13:00 - 14:00h	Lunch
14:00 - 14:45h	**Phylogenetic trees from high-throughput sequence data** (AR) - Lecture and practical example (*iTOL*)
14:45 – 15:30	**Exploring Online Resources and Repositories II** (MS) - Lecture and practical examples (*IMG, MG-RAST, KBase*)
15:30 - 16:15h	**Alternative statistical and data analyses** (MS) - Lecture and practical examples (AIC, Networks, etc.)
16:15 - 17:00h	**Coffee and Posters Session**

Day 3 - September 6th, 2024

Time	Agenda item
Two parallel "hands-on" sessions (metabarcoding and metagenomics)	
Metabarcoding (09:30 - 17:00h, Room 011)	**From raw data to community structure insights** (FP + MS) - Raw read processing in R. Data cleaning and normalization. Ecological and compositional analysis. Questions, discussions, etc.
Metagenomics (09:30 - 17:00h, Room 012)	**From raw data to taxonomic and functional insights** (AR + NG) - Raw read processing in Python. Data cleaning and normalization. Taxonomic and functional annotation. Questions, discussions, etc.

Server infrastructure for the "hands-on" sessions will be supported through national funds provided by FCT (ref:CPCA - IAC/AV/591374/2023).