

## **Module 4 / FISABIO Summer School in Biomedical Research and Public Health: Microbial Genomics & Metagenomics Workshop**

**Dates: July 8<sup>th</sup> – July 12<sup>th</sup> 2019**

**Organizer: M. Pilar Francino**

The workshop is addressed to students and professionals of biology, biomedical research, the health sciences and related fields who are interested in learning and sharing concepts, tools and research results in genomics, metagenomics and the human microbiome. The workshop will train participants in state-of-the-art analytical methods in this area, by means of theoretical lectures and seminars as well as practical hands-on sessions in bioinformatics and biostatistics. Several sessions will be devoted to training in the use of the Integrated Microbial Genomes system (IMG), a database and analysis platform developed at the U.S. DOE Joint Genome Institute (Walnut Creek, California) for comprehensive studies of genomes and metagenomes. The IMG system will be presented by Dr. David Páez from the JGI's Microbial Genomics & Metagenomics Scientific Program, the group responsible for IMG development.

### **Instructors:**

**Giuseppe D'Auria**, PhD. Scientist, FISABIO-PUBLIC HEALTH Genomics and Health Area and CIBERESP. Coordinator of FISABIO Sequencing and Bioinformatics Service ([dauria\\_giu@gva.es](mailto:dauria_giu@gva.es)).

**M. Pilar Francino**, PhD. Scientist, FISABIO-PUBLIC HEALTH Genomics and Health Area and CIBERESP ([francino\\_pil@gva.es](mailto:francino_pil@gva.es)).

**M. José Gosalbes**, PhD. Scientist, FISABIO-PUBLIC HEALTH Genomics and Health Area and CIBERESP ([gosalbes\\_mjo@gva.es](mailto:gosalbes_mjo@gva.es)).

**David Páez**, PhD. Scientist, JGI, Microbial Genomics & Metagenomics Scientific Program ([adpaezespino@lbl.gov](mailto:adpaezespino@lbl.gov)).

**David Perez-Villarroya**, MS. in Bioinformatics ([pevida@alumni.uv.es](mailto:pevida@alumni.uv.es)).

**Mariana Reyes**, MS. in molecular, cellular biology and genetics, FISABIO- PUBLIC HEALTH, Bioinformatician at Sequencing and Bioinformatics Service ([reyes\\_ber@gva.es](mailto:reyes_ber@gva.es)).

## Module program:

### **Monday July 8<sup>th</sup>:**

- 09:00 - 09:15 Welcome and Overview of the Workshop by Dr. M. Pilar Francino.
- 09:15 - 10:00 Features and Diversity of Microbial Genomes by Dr. M. Pilar Francino.
- 10:00 - 11:00 Microbial communities, the human microbiome and its relationship to health by Dr. M. Pilar Francino.

#### Break

- 11:15 - 13:15 Metagenomic and Metatranscriptomic Analyses of Bacterial Communities by Dr. María José Gosálbes.

#### Lunch

- 15:00 - 18:00 Unix commands and moving around the system by David Pérez-Villarroya.

### **Tuesday July 9<sup>th</sup>:**

- 09:00 - 10:00 Informatic Processing and Quality Control of Sequencing Reads by Mariana Reyes.
- 10:00 - 11:00 Microbial Diversity Analyses with 16S rRNA (I) by Dr. Giuseppe D'Auria.

#### Break

- 11:15 - 13:15 Microbial Diversity Analyses with 16S rRNA (II) by Dr. Giuseppe D'Auria.

#### Lunch

- 15:00 - 18:00 Read Mapping and Variant Calling by Mariana Reyes.

### **Wednesday July 10<sup>th</sup>:**

- 09:00 - 11:00 Sequence Assembly and Annotation (I) by Dr. Giuseppe D'Auria.

#### Break

- 11:15 - 12:15 Sequence Assembly and Annotation (II) by Dr. Giuseppe D'Auria.
- 12:15 - 13:15 Introduction to the Integrated Microbial Genomics system by Dr David Páez.

#### Lunch

- 15:00 - 16:00 IMG Genomes: Live Demonstration by Dr. David Páez and Dr. M. Pilar Francino.
- 16:00 - 17:00 IMG Genes: Live Demonstration by Dr. David Páez and Dr. M. Pilar Francino.
- 17:00 - 18:00 IMG Functions and Pathways: Live Demonstration by Dr. David Páez and Dr. M. Pilar Francino.

### **Thursday July 11<sup>th</sup>:**

- 09:00 - 10:00 Introduction to IMG/M by Dr. David Páez.
- 10:00 - 11:00 IMG/M Metagenome Analysis: Live Demonstration by Dr. David Páez and Dr. M. Pilar Francino.

#### Break

- 11:15 - 12:15 Metagenome Binning Techniques: From a User Perspective by Dr. David Páez.
- 12:15 - 13:15 Uncovering Earth's virome by Dr. David Páez

#### Lunch

- 15:00 - 16:00 Metagenome Analysis Research Talk by Dr. M. Pilar Francino.
- 16:00 - 18:00 Preparation of student analysis projects: students form groups and design their genome or metagenome analysis project, supervised by Dr. David Páez and Dr. M. Pilar Francino.

### **Friday July 12<sup>th</sup>:**

- 09:00 - 11:00 Students complete their projects, supervised by Dr. David Páez and Dr. M. Pilar Francino.

#### Break

- 11:15 - 12:15 Presentations of metagenome analysis projects by student groups, supervised by Dr. David Páez and Dr. M. Pilar Francino.
- 12:15 - 13:15 IMG Tutorial Summary, Discussion and Questions, supervised by Dr. David Páez and Dr. M. Pilar Francino.