PhD Program in Genetics, Molecular and Cellular Biology

Advanced Course entitled:
"Bioinformatics for genome and pangenome assembly, analysis and visualization"

Instructors:

Dr. Giulio Formenti (Vertebrate Genome Lab, The Rockefeller University, New York, USA)
Dr. Guido Gallo (Department of Biosciences, University of Milan, Milan, Italy).

Room: Buzzati-Traverso, Dept. Biology and Biotechnology

Monday 8th April (h: 9:00-13:00)
-Lesson 1: introduction on the history of DNA sequencing and bioinformatics
-Lesson 2: overview of most popular methods for DNA sequencing, both low-throughput (Sanger) and high-throughput (Next-Gen/Illumina sequencing, Third-Generation/Pacbio and ONT Long-read sequencing).

Wednesday 10th April (h: 14:00-18:00)
-Lesson 3: principles of bioinformatics for sequencing data
-Lesson 4: overview of databases, data formats and useful software

Friday 12th April (h: 9:00-13:00)
-Lesson 5: practical session on linear genome assembly (using hifiasm), analysis and visualization (e.g with Bandage) in Gitpod using a yeast dataset. Details on genome assembly algorithms (greedy, De Brujin graphs, OLC, string graphs) will also be discussed.

Wednesday 17th April (h: 14:00-18:00)
-Lesson 6: introduction to pangenomes
-Lesson 7: pangenomes for human population genetics and evolutionary studies
Speakers: Dr. Alessandro Raveane & Dr. Davide Bolognini, Human Technopole, Milan, Italy;
Dr. Andrea Guarracino, University of Tennessee, US.

Friday 19th April (h: 9:00-13:00)
-Lesson 8: practical session on pangenome variation graph building, analysis and visualization (e.g with Bandage and SequenceTubeMap) in Gitpod using a yeast dataset (using pipelines such as ODGI, PGGB). Such graphs will also be used for downstream applications, including read alignment, variant calling and visualization, comparing results between the genome and the pangenome.

Link zoom: https://zoom.us/j/96309787767

Organizers and Examination committee: Proff. A. Achilli, L. Gomulski, F. Lescai, A. Olivieri, L. Ometto, E. Raimondi, O. Semino, Dr. N. Rambaldi Migliore