

Advanced Bioinformatics Workshop

Date: Monday, August 20th – Friday, August 24th, 2018

Venue: Adriatico Guest House - Denardo Lecture Hall

International Centre for Theoretical Physics

Trieste, Italy

Course URL: <http://www.codata.org/datatrieste2018>

Material: <https://codata-rda-advanced-bioinformatics-2018.readthedocs.io>

Description

This advanced bioinformatics course will provide an overview of the current status of different NGS workflows (variant calling, RNA-Seq, ChIP-Seq, etc), and combine them with the appropriate Machine Learning and Data Mining approaches. The course will heavily rely on hand-on exercises and tutorials, and attempt to provide a strong foundation on the underlying theory.

Instructors

- **Fotis Psomopoulos**, Institute of Applied Biosciences (INAB|CERTH) / ELIXIR GR
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- **Amel Ghouila**, Institut Pasteur de Tunis / H3Bionet
- **Gabriele Schweikert**, Cyber Valley Initiative, University of Tuebingen, DE /
Computational Biology, University of Dundee, UK

Course Schedule

	Topic
<i>Day 1</i>	
11:30 – 12:30	Experiments: Design and Analysis
14:00 – 15:00	Components of an Experiment. What is a good experiment design?
15:00 – 16:00	Data Distributions and Multiple Hypotheses Adjustment Methods
16:15 – 18:00	Introduction to basic NGS pipelines
<i>Day 2</i>	
09:00 – 10:00	Introduction to basic NGS pipelines
10:00 – 11:00	Short read quality and trimming
11:30 – 12:30	Mapping and Variant calling
14:00 – 15:00	Introduction to Machine Learning and Data Mining
15:00 – 16:00	Taxonomy of ML and examples of algorithms
16:15 – 18:00	Applications of ML in Bioinformatics
<i>Day 3</i>	
09:00 – 10:00	Introduction to Supervised algorithms
10:00 – 11:00	Hands-on Application to supervised algorithms
11:30 – 12:30	Hands-on Practical Topics in ML/DM Part 1
14:00 – 15:00	Hands-on Clustering Part 1
15:00 – 16:00	Hands-on Clustering Part 2
16:15 – 18:00	Hands-on - Apply algorithms to own dataset

<i>Day 4</i>	
09:00 – 10:00	Introduction to ChIP-Seq, ATAC-Seq, BS-Seq
10:00 – 11:00	Hands-on application: ChIP-Seq workflow (part 1)
11:30 – 12:30	Hands-on application: ChIP-Seq workflow (part 2)
14:00 – 15:00	Hands-on application: ATAC-Seq
15:00 – 16:00	Hands-on – Apply algorithms to own dataset
16:15 – 18:00	Hands-on
<i>Day 5</i>	
09:00 – 10:00	Introduction to Regression
10:00 – 11:00	Hands-on application: regression algorithms - pros and cons
11:30 – 12:30	Closing, Final Remarks, Post-workshop survey