UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Course unit English denomination	Genomics & Bioinformatics hands-on
SS	BIOS-07/A
Teacher in charge	Marco Giorgio
Teaching Hours	10
Number of ECTS credits allocated	2
Course period	
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	English
Mandatory attendance	☒ Yes (80% minimum of presence) ☐ No
Course unit contents	This course explores the conceptual framework behind how genomic functions impact disease. It covers technologies used to examine cell identity and genomic alterations. It also explains how to prepare samples for single-cell and spatial epigenetic/transcriptomic studies. Moreover, it offers introductory training in sequencing data analysis, including hands-on work with real datasets. Lesson Plan: 1) Cell identity and plasticity, epigenetic errors, transcriptional noise and cellular heterogeneity. 2) Exposome-genome crosstalk, long term imprinting and maladaptation. 3) NGS devices, theory and practice. 4) Chromatin and RNA tools, at single cell and spatial levels. 5. RNAseq data set analysis - pipeline description - be part of the galaxy "community". 6 – 10) Hands-on from fastq to bam files, quality check, alignment to ref genome, samples clustering, stat tricks, differential analysis, gene onthology, upstream regulators.
Learning goals	This course aims to provide: i) training with state of the art technologies and experimental procedures used to study genomic adaptation; ii) the skill to understand complicated genomic data and relate them to information from different biological areas; iii) the ability to incorporate methods for exploring and analyzing genomic behavior into research programs focused on understanding disease mechanisms.

Teaching methods	Lectures with case discussions, working groups and interactive computational analysis sessions.
Course on transversal, interdisciplinary, transdisciplinary skills	☐ Yes ☒ No
Available for PhD students from other courses	☒ Yes Classes are open to doctoral students only in the following courses: Biosciences ☐ No
Prerequisites	Understanding the terminology and the main molecular processes of genetics, epigenetics and gene expression control.
Examination methods (if applicable)	Checking the outcomes from the exercise completed during the lessons.
Suggested readings	Teaching material and applications exchanged during the course.
Additional information	An up-to-date personal notebook is required