



GENOMICS AND DNA PROFILING

Enrollment year	2021/2022
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/18 (GENETICS)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	ADVANCED BIOTECHNOLOGY
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (01/10/2021 - 14/01/2022)
ECTS	6
Lesson hours	52 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	OLIVIERI ANNA (titolare) - 3 ECTS ACHILLI ALESSANDRO - 3 ECTS
Prerequisites	Students must have acquired the contents of the courses Genetics and Molecular Biology, which will be crucial to understand the topics of the present course.
Learning outcomes	The course aims to describe the recent progress of molecular biotechnology for the study and genomic characterization of simple and complex organisms, from theoretical bases to case studies and to applications in biological, agronomic, forensic and environmental fields. In the first part, the genome projects will be presented describing the new sequencing systems and other methods used for their accomplishment. In the second part, we will present the functional and comparative genomics approaches that allow the interpretation of a genomic sequence, the gene annotation and the identification of

	informational variants. Finally, in the last part the targeted genotyping techniques will be presented with specific application on case studies.
Course contents	<p>From biological samples to DNA. Isolation, purification and quantification of nucleic acids from different biological sources. Advantages, disadvantages and applications. De-novo sequencing and re-sequencing. Sanger sequencing. Next generation sequencing (NGS): Illumina, Ion-Torrent. Moving toward third generation sequencing. Capture and enrichment systems for target sequencing. Structural genomics. Localization and gene annotation. Functional genomics. Determination of gene function (forward genetics and reverse genetics). Genome projects: from model organisms to humans. Comparative genomics. Evolutionary models and molecular phylogenetics: from molecular data to phylogenetic classifications. Novel genotyping systems. Molecular markers and genomic analysis. Screening with microsatellites. Examples of application in forensic genetics. SNP and DNA chips. Towards a personalized Genomics. Genotyping and food traceability. Applications of molecular genetics technics in agriculture.</p>
Teaching methods	Face to face lessons and practical training.
Reccomended or required readings	<p>BIOTECNOLOGIE MOLECOLARI (Principi e tecniche) Seconda edizione (Brown TA – Zanichelli). Genomes (Brown TA – Edises).</p> <p>Presentation slides will be crucial for the final exam.</p>
Assessment methods	Oral exam: an interview on the topics covered during the lectures and on laboratory activities.
Further information	<p>For further information: alessandro.achilli@unipv.it anna.olivieri@unipv.it</p>
Sustainable development goals - Agenda 2030	<p>Some of the topics in this course are in line with the 2030 Agenda for Sustainable Development, in particular with Goal 15 - Protect, restore and promote sustainable use of terrestrial ecosystems / halt biodiversity loss.</p> <p>The goals</p>