



MOLECULAR DIAGNOSTIC METHODOLOGY

Enrollment year	2019/2020
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/12 (CLINICAL BIOCHEMISTRY AND BIOLOGY)
Department	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
Course	BIOTECHNOLOGY
Curriculum	PERCORSO COMUNE
Year of study	3°
Period	2nd semester (01/03/2022 - 14/06/2022)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	WRITTEN TEST
Teacher	PALLADINI GIOVANNI (titolare) - 3 ECTS NUVOLONE MARIO ULISSE - 3 ECTS
Prerequisites	=
Learning outcomes	The student: 1) Will know the main techniques of molecular biology for the extraction, amplification and analysis of nucleic acids 2) Will know the main applications of molecular diagnostics as well as the basic aspects of diagnostic reasoning
Course contents	1. Fundamentals of diagnostic reasoning 2. Nucleic acid extraction techniques 3. Nucleic acid quantification techniques 4. Nucleic acid quality control 5. Nucleic acid amplification techniques: basic principles, main types 6. Polymerase chain reaction: basic principles, assay design, technical

	<p>considerations, main applications</p> <p>7. PCR variants: Hot start PCR, Touch down PCR, Nested PCR, Multiplex PCR, Inverse PCR, Direct PCR, GC-rich PCR, Reverse transcriptase polymerase chain reaction (RT-PCR), Quantitative polymerase chain reaction (qPCR), real time qPCR, Reverse transcriptase qPCR (RT-qPCR), digital PCR</p> <p>8. Nucleic acid electrophoresis</p> <p>9. Restriction Fragment Length Polymorphism (RFLP)</p> <p>10. PCR Restriction Fragment Length Polymorphism (PCR-RFLP)</p> <p>11. High resolution melting analysis</p> <p>12. Microarrays: SNV chips, gene expression microarrays, Arrays for comparative genomic hybridization (aCGH)</p> <p>13. In situ hybridization: Fluorescence in situ hybridization (FISH), Spectral karyotyping (SKY)</p> <p>14. Dideoxy-Termination Sequencing (Sanger Sequencing)</p> <p>15. Massively parallel sequencing: basic principles</p> <p>16. Bridge amplification and reversible dye terminator sequencing</p> <p>17. Real-Time single molecule sequencing with fluorescent nucleotides</p> <p>18. Target-enrichment strategies for massively parallel sequencing</p> <p>19. Whole-exome sequencing (WES)</p> <p>20. Applications of molecular diagnostics: examples on selected clinical settings</p>
Teaching methods	<p>- Frontal lectures</p> <p>- Laboratory case discussion</p>
Recommened or required readings	<p>Tietz textbook of Clinical Chemistry and molecular diagnostics</p> <p>Ciaccio Lippi - Biochimica Clinica e Medicina di Laboratorio</p>
Assessment methods	<p>Written test (multiple choice test)</p>
Further information	
Sustainable development goals - Agenda 2030	<p>NA</p> <p>\$lbl legenda sviluppo sostenibile</p>