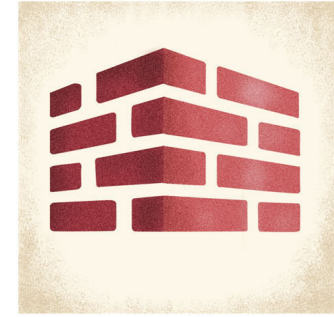




learning genomics for food safety



Intellectual Output N.1

A new professional/research profile: the Food Microbial Bioinformatician (FMB)

FMB Activities

Macroactivities

Activities

Plan, define and organise FM research/analysis (including professional, organisational, economic and technological resources)

Define the scope of the bioinformatics/FMB researches and analyses (applied to food safety)

Define professional needs to perform/FMB researches and analyses (applied to food safety)

Organise the activities for sequencing (all the different "omics" approaches)

Implement national and international partnership for enhancing research quality

Respect relevant legislation in force

Do bioinformatics and computational analyses

Access data:

- Access data resources to perform job duties
- Access and handling of data storage repositories

Ensure the quality of the samples and raw data

- Ensure the quality of the biosample
- Ensure the quality of raw reads (from different NGS platforms)

Retrieve data on Public sequence archives, repositories, and databases (input/output)

Carry on genome analyses including data retrieved

- Carry on genome analyses using Linux operating system
- Carry on genome analyses using open source tools or commercial software
- Carry on NGS analyses to perform foodborne outbreak investigation, laboratory-based surveillance and microbial risk assessment

Respect relevant legislation in force

Elaborate reports

Elaborate reports using results from:

- foodborne outbreak investigation
- in place laboratory-based surveillance
- microbial risk assessment
- innovative researches
- bio-economics after the estimation of economic losses

Communicate results

Disseminate the results on scientific papers, guidelines, official release of documents and/or within relevant events (conferences, congresses, seminars, workshops, meetings)

Facilitate exploitation of the research results

Ensure the respect of quality standards

Implement "Risk-based thinking" as part of the working process approach

Apply Standard Operation Procedures (SOPs)

Monitor, control and evaluate processes, outputs and outcomes

Assess the achievement of customer satisfaction targets

FMB Knowledge, Technical Competences, Primary Soft Skills

Knowledge (in order of importance)	Technical competences (in order of importance)	Primary soft skills (in order of importance)
Whole genome sequencing based on NGS technologies	NGS Data analysis: general principles	Attention: Selective attention, divided attention
Archive, Repository and Database	Data collection scientific needs (what, why, metadata catalogues list)	Motivation: Initiative
Assessment of data quality: key step of NGS data analysis	Use of different data analysis platforms	Memory: Sensory memory, working memory (information processing), explicit memory (autobiographical and knowledge), implicit memory (procedures and conditionings)
NGS Data analysis: general principles	Phylogenetic analyses	Problem solving: Strategic planning, decision making, logical-analytical ability and creativity
Antimicrobial resistance and gene virulence of foodborne pathogens	Public Archive, Repository and Database	Self-Mastery: Self-control, flexibility, time management
Linux operative system (command line working and environment)	Contribution to national and international research projects	Numerical cognition: Quantitative and symbolic, calculation procedures, mathematical knowledge
Molecular biology	Planning the research process, collection of experimental data and evaluation of genetic data	Awareness: Self-assessment
Methodology of scientific research	Entry-level programming in at least one language	Empathy: Assisting and understanding others
NGS laboratory methods (ILLUMINA, PACBIO, ION TORRENT, MINION, ...)	WGS data analysis	Interpersonal Skills: Communication Skills (written communication; Public speaking)
Genetics	Research Methodology	Leadership: Development of personal and other abilities (capacity building), promotion of diversity, management of group dynamics, change management process, lead the team to goals
Microbiology	Drafting or designing protocols	Visual-spatial skills: Visualisation
Report processing and communication	Project management	Perceptual-motor abilities: Sensory perception and motor patterns
Microbial pathogenesis	Drafting scientific papers, guidelines, official documents, etc.	
Relevant legislation	Installing programmes or applications on PC	
Structure and function of DNA	Software testing	
Zoonoses and food and waterborne diseases	Database management and data collection systems implementation	
Transmission of pathogenic microbes	Mathematical modelling	
Food and feed safety, technology and science (Food for human consumption and feed)	Planning	
Risk analysis in food and feed	Sampling strategies	
Mathematical modelling	Risk analysis related to working processes	
Quality standards (e.g. ISO 9001:2015 and UNI CEI EN ISO/IEC 17025:2018)	Software customisation	
One Health scenario- containment of the microbial resistance of possible zoonotic origin in health care	Theories elaboration	
Quantitative microbiology	Maintainance of IT systems or programmes	
Biochemistry	Zoonoses and food and waterborne diseases	
Transcriptomics	Laboratory techniques (Conventional and molecular techniques)	
RNA	Methodology of scientific research	
Proteins	Microbiology	
Proteomics	One Health scenario- containment of the microbial resistance of possible zoonotic origin in health care	
Genetic engineering	Transmission of pathogenic microbes	
Laboratory techniques (Conventional and molecular techniques)		
Traceability systems for food and feed		